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ISSUES IN THE NATIONAL FINANCING OF HEALTH CARE

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SUBCOMMITTEE ON
HEALTH AND THE ENVIRONMENT

OF THE

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FOREIGN COMMERCE

U.S. HOUSE OF REPRESENTATIVES

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Congress of the United States
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SUBCOMMITTEE ON HEALTH AND
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WASHINGTON, D.C. 20515

November 4, 1976

The Honorable Harley O. Staggers
Chairman, Committee on Interstate
and Foreign Commerce
2125 Rayburn House Office Building
Washington, D.C. 20515

Dear Mr. Chairman:

I am transmitting herewith a report dealing with many of the issues involved in the financing of health care prepared by a select study group chaired by Glenn Wilson, Associate Dean of the University of North Carolina School of Medicine at Chapel Hill, North Carolina.

While I do not necessarily concur in all of the conclusions drawn by the authors of this report, I believe this report represents an important addition to the current debate on the components of national health insurance and will prove valuable in our continuing consideration of the issues involved in financing health care.

I commend the report to you and all Members of the Committee.

Sincerely yours,

PAUL G. ROGERS, M.C.

PGR:jag

Enclosure

ACKNOWLEDGEMENTS

This conclusion, recommendation and summary paper represents the collective judgment of the following individuals who undertook the examination of issues involved in the national financing of health care: Jim Begun, Jim Bernstein, Jill Camnitz, Phil Compeau, Claude Drake, Mike Durfee, Connie Evashwick, Dennis Gillings, Ed Gustavson, Eric Jensen, Clark Luikart, David McKay, David Metz, Sally Powell, Shirley Powell, Vinnie Karriker, and Glenn Wilson. Although each of us is not entirely satisfied with each comment, the months of review of data and the extended debate have persuaded us that the central thrust of this summary document is accurate.

The longer papers on population, demand for physician services and hospital care, manpower, technology, medical care facilities, organization, and financing, which form the basis for our conclusions and recommendations are the work of the individuals who are identified on the respective documents.

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CONCLUSIONS, RECOMMENDATIONS AND SUMMARY

on

NATIONAL FINANCING OF HEALTH CARE

INTRODUCTION

In an exchange of letters with Congressman Paul Rogers, Chairman of the Subcommittee on Public Health and Environment, in the summer of 1975, we agreed to examine some of the issues underlying the development of national health insurance. We did not propose original research, and it would be presumptuous to imply that our review of available information has been exhaustive or our insights unique. Further, we did not attempt to address all the questions but rather a few which in our judgement are central to considering national health insurance.

General public frustration with the increasing cost of and the difficult access to health care has led the Congress to a debate on methods for national financing. The national debate is focused on the scope of benefits, costs, and the administrative role of government and private organizations.

These are important questions. However, there are prior concerns which we feel should be considered first: for example, the current and projected demand for health services; the nation's future health manpower and physical resource capability; the impact of new technology and various organizational forms on the financing and delivery of medical care; and, most importantly, the interaction of these several elements. Unless these factors are addressed, it is possible that

national insurance will redistribute the costs of illness without controlling them and accelerate the inflation of health service prices without improving access or quality. National financing by itself cannot ensure better health.

Half of the new dollars spent on health care since the enactment of Medicare and Medicaid have been consumed simply in keeping up with price inflation. The answer to the problems of access to needed services at reasonable cost and quality is not simply more manpower and facilities, or more schemes for organization and financing. Further opening of the federal purse without well-specified objectives and measures for achieving them is unlikely either to alleviate public dissatisfaction or to dampen the inflationary fires.

Medicine has impressively effective, if expensive, ways of treating disease and diminishing suffering and disability. But the prevalent hope that through national financing these achievements will automatically lead to a positive promotion of health is seriously misleading. The subtle merger of the expectations and policies for medical care with those for health may lead to disappointment.

It has been customary in this country to consider the component issues of health care separately, to increase personnel and facilities and to subsidize organization and financing without considering the likely subsequent interaction between these efforts. Our experience with private hospital insurance has shown that when inpatient costs are reimbursed and outpatient costs are not, excess hospital rooms will be built and used in situations where alternate care would have been more efficient. Regional comparisons of services given by

specialists suggest that such services vary with the availability of the trained personnel rather than with differences in occurrence of conditions requiring the specialized service. Complaints of difficulty in obtaining care are reported in communities where there is one physician for every 400 persons and hospital use exceeds one day per person per year! Elsewhere, with prepaid group medical practice plans, general satisfaction is found with half the hospital use and only one physician per 1,000 population. Thus, how financing is provided can influence personnel and facility use. How manpower is trained influences the future demand for facilities and financing. How care is organized influences manpower and facility requirements. Every action or inaction in one category has an impact on the others, and expenditure in one area encumbers present and future funds to support the use pattern it has engendered in other areas.

Medical care is a necessary, but not sufficient, foundation for improving health. Even optimal integration of the elements of good care can have only limited impact on the nation's health. There is a growing awareness of the close relationship between physical and mental health and the social, economic, and environmental problems in our society. The "new morbidity" arising from these problems is little affected by the technologically oriented services of the modern hospital. Conversely, people use medical services for varied reasons, not all medically related, and a small number of individuals demand a large proportion of service. The system often deals inappropriately with this demand, thereby perpetuating an economic burden without satisfying the need expressed. Thus a true "health care system" must deal with varied human needs and differentiate between these and the demands made on an illness-oriented system.

We have reviewed utilization patterns and projections of population and manpower development. We have considered problems in the use of technology and the definition of need. We have weighed various options for organization and financing. The data we have found relevant are complex, incomplete, and often contradictory. Despite these uncertainties we believe it is useful to offer the following conclusions.

CONCLUSIONS

1. While fluctuations in the birth rate may alter the relative proportions of younger and older age groups, the national population will probably increase by about 25% in the next 25 years with a continuing concentration in metropolitan areas and in older age groups. Although the proportion of the population living in rural areas will decline, the numbers will remain relatively constant.*

2. There were an estimated 1.05 billion physician visits in 1974. The projected population can be expected to use about 1.22 billion physician visits in 1990 and 1.35 billion visits in the year 2000. We have found no objective basis for anticipating a net increase or decrease in the per capita demand for physician services.

3. In 1974 there were approximately 367,000 active physicians in the United States. Manpower projections indicate that if the present physician training and immigration policies are maintained, the nation will have approximately 596,000 active physicians in 1990 and 777,000 in 2000. If the 1974 rate of visits per active physician prevails, there will be a capacity for 1.70 billion visits in 1990 and 2.21 billion visits in 2000.

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* The population, demand, and manpower estimates given in the summary paper are selected mid-point figures from a range of estimates. Upper and lower bounds for these estimates are presented in the more detailed working papers.

4. Comparison of these demand and manpower projections suggest that by 1990 we will have a growing "excess capacity" relative to projected demand for physician visits which by the year 2000 will be nearly 50%. This "excess" of available physician time may result in better quality care. More time may be spent in study and leisure activities or in longer contact with each patient or in giving a broader range of services. However, since demand for medical care is largely influenced by the provider, with a tendency to expand as more services are available, the overall effect of this "excess capacity" is likely to be severe inflation without necessary improvement in health or in the quality and accessibility of care.

5. The frequent assumption that increasing the aggregate supply of health professionals will by itself improve their geographic distribution is not borne out by the data we have examined.

6. Physicians are commonly consulted for a variety of problems where the efficacy of their service is uncertain and where other less expensive professionals may be at least as effective. A high proportion of the demand for physician office care is for self-limiting minor illness or anxiety-related complaints which may be as usefully handled by other personnel.

7. In 1973 there were approximately 904,000 non-federal acute general care hospital beds in the United States with a theoretical capacity for supplying 330 million bed days of hospital care. At 85% occupancy, this corresponds to an actual current capacity for supplying 281 million bed days. In 1974 there was an estimated demand for 253 million bed days of hospital care. At this level of demand the need for hospital days per year will be 287 million bed days in 1990 and 329 million bed days in 2000.

8. At 85% occupancy, the total hospital beds available in 1973 would almost accommodate the bed day demand projected for the year 1990. While there appear to be some problems in the geographical distribution of hospital beds, with 576 of the 3084 counties in the United States lacking an acute care general hospital, only 16 of these counties have a population (40,000 or more) which is sufficient to economically support a 100 bed hospital. Thus, the need is not for more facilities but for more reasonable use of what is already available.

9. The steady expansion of community hospitals and the scope of their services has consumed a major portion of health expenditures -- an inefficient expenditure since many of these facilities are under-utilized and maintain high fixed costs. The widespread development of technological devices and specialized personnel in these institutions contributes to an inflationary trend and encumbers future funds. Overall, within three years the cumulative operating cost of such facilities equals the capital investment.

10. More than 90% of the total population now has some form of insurance against the cost of hospital care. This financing, coupled with cost reimbursement with little incentive to individuals to contain cost, remains a major inflationary factor in health care expenditures.

11. Many technologic devices and procedures gain more widespread acceptance than is justified by the benefits they offer. Many are very expensive; some may even ultimately do more harm than good. Although methods which would provide guidelines for evaluating these technologies have been developed, the use of these methods requires more coordination.

12. A great deal of experience, much of it unique to this country, has been accumulated with varied forms of health care organizations. Insufficient national attention has been given to the implications of these efforts for using manpower and facility resources efficiently and effectively.

13. The existing health care system is characterized by increasingly numerous and fractious groups of both personnel and institutions competing for overlapping roles, and diffusing accountability for patient satisfaction, cost containment, and quality of care. The managers of the health care system have very little control over those professionals who provide the services.

14. There are three discrete issues often blurred in health policy discussions: (a) the promotion of "positive" health, (b) the diagnosis and treatment of illness, and (c) the use of medical services for social and emotional problems. The common equation of health care with the diagnosis and treatment of disease confuses policy, as does the use of the term "national health insurance" for financing an illness care system. Intriguing proposals have been advanced for re-orienting the education of professionals and the general public towards the promotion of health. Unfortunately, there is no ready consensus on the likely costs and benefits of this approach.

15. In 1974 expenditures for health services amounted to $104.2 billion. On the basis of past experience, it should be expected that the current production of manpower and facilities will dramatically increase health services cost regardless of the form of financing.

RECOMMENDATIONS

As previously noted, past consideration of the individual components and problems of the nation's health care system has resulted in piecemeal and fragmented action. Our assessment of the available data, leading to the conclusions presented above, has led us to propose a series of recommendations addressing a range of elements which must be included in any plan for a national health financing. In our view, single recommendations should not be viewed or extracted as isolated suggestions worthy of implementation. Instead, the following recommendations, taken together, form a preliminary framework upon which an interrelated and comprehensive national health policy might be developed.

1. There should be no national health financing until there is a coordinated national health policy. Such a policy should integrate considerations of need and demand for health care with the development of appropriate manpower, facilities, technology and the organization of services.

2. This national health policy should specify and distinguish between objectives for the provision of illness care, the promotion of health, and the treatment of social and emotional problems.

3. A national plan for financing health care when established should include full payment for immunization, family planning, care during pregnancy, and in the first thirteen months of life.

4. Some direct personal responsibility for a portion of the costs of other services should be maintained by using a graduated annual deductible for each person or family. Such deductibles should be progressive so as to assure that low income families are not

denied access to needed services. An effective national health policy could over time permit reduction and perhaps elimination of the deductible.

5. National manpower policy should: (a) sharply reduce the flow of foreign medical graduates; (b) provide no further stimulation for increased physician training; (c) examine the need for other health professional training, such as nursing and allied health; (d) develop a long-range program to change the specialty distribution of physicians so that this distribution corresponds to the demand for health care; and (e) at the same time balance the supply of physicians with primary care extenders and appropriate allied medical workers.

6. In order to bring about a better distribution of personnel, national financing should: (a) provide additional physician compensation for services delivered in underserved areas; (b) provide sufficient support to attract all types of health personnel into the National Health Service Corps on a voluntary basis; (c) offer incentives to institutions training health personnel to emphasize primary care and regional responsibility for personnel distribution; and (d) offer financial incentives to encourage resource-rich urban areas to assume responsibility for either direct or back-up services to underserved areas.

7. Hospitals and other health facilities should be franchised and integrated on a regional basis. Hospitals should be designated according to specified functions as primary, secondary, or tertiary care facilities. Once the functional objective of each level is established, monetary incentives should be developed for both

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management and physicians to discourage unnecessary hospital use and the proliferation of expensive personnel and equipment beyond that which can be efficiently and appropriately used in the specified level of facility. In general, hospital construction should be restricted to needs for modernization and service consolidation with no net increase in the number of beds available.

8. National policy should provide criteria for the adoption and development of new technologic devices and procedures. Implementation of these criteria to evaluate the effects of new technology requires (a) a coordinated effort which can probably only take place on a national level, and (b) a setting in which scientific rules of evidence prevail and all evidence is open to public and scientific scrutiny and rebuttal.

9. National financing should stimulate and encourage a single capitation pre-payment for physician services and hospital care on a geographic basis. Where this is not feasible, capitation payments for physician services separately should be encouraged. The dollar amount paid by the government on behalf of the individual should be the same regardless of whether the individual selects a fee for service or capitation system.

10. The financing plans for catastrophic illness should include direct incentives to the physician to limit expenses to essential services. Alleviating public concern with protection against the financial disaster of prolonged illness should not be allowed to focus professional education and attention on esoteric conditions at the expense of more appropriate care for the common problems of the population.

Summary Table

	Current Baseline	1990 Projection	2000 Projection
1. U.S. Population	211 million (1974)	247 million	264 million
2. Number of Physicians	367,000 (1974)	596,000	777,000
3. Out-patient Demand (Physician Visits)	1.05 billion (1974)	1.22 billion	1.3 billion
4. Out-patient Capacity (Physician Visits)	1.05 billion (1974)	1.70 billion	2.21 billion
5. In-patient Capacity (Bed-days in Hospitals)	281 million* (1973)	----------	----------
6. In-patient Demand (Bed-days in Hospitals)	253 million (1974)	287 million	329 million

* Based on 85% occupancy.

WORKING PAPER SUMMARIES

The previous conclusions and recommendations were formed on the basis of findings and discussion contained in several longer reports. The following pages summarize the findings and conclusions of the more detailed documents.

Population

The future size, structure, and geographic distribution of the United States population are important factors to be accounted for in the long-term planning of the nation's health care services. However, population projections depend critically on the birth rates that will take place in future years. There seems broad support for assuming that there will be an average of 2.1 births per woman in the child-bearing ages through the end of the century. The additional assumption of a net immigration rate of 400,000 persons per year leads to a projected United States population of 246.6 million in 1990 and 264 million at the turn of the century. On May 1, 1975, the Bureau of the Census estimated the United States population was then 213,257,000. In other words, there is likely to be about 51 million more persons in the United States (that is, an increase of 25%) at the end of the last quarter of the 20th Century than there was at the beginning. If the birth rate returns to the higher levels of the 1950's, then the increase in population will be greater still.

This increase in population will not be spread uniformly over the nation. In particular, the Western Region of the United States is expected to have a more accelerated rate of population increase

than the remainder of the country. Also, the age structure will not remain constant. The 18-24 age group, or youth population, is likely to experience a net decline whereas the over 65's will increase in number.

This change in the size of the youth population will not be a gradual trend. The number of youths will increase by 13% between 1972 and 1980; however, between 1980 and 1990 it will decrease by 15%. For the age group 25 to 44, there will be a high growth rate during this same period, and it will be less variable, with projected estimates of 24% growth in the first period and 26% increase in the second.

It is estimated that the number of older adults of working age will rise very little between 1972 and 1990, while the aged (over 65) population will increase by about one third, due to the past general rise in the number of births (up to the early 1920's), the drop in age-specific death rates, and the large volume of immigration, particularly before World War I. Beyond 1990 the aged population's growth rate will probably drop sharply for a decade or two, due to the decrease in the number of post-1920 births.

These variations in growth rates will result in shifts in the overall age distribution between 1972 and 1990. Further shifts may arise, as the age structure of the population in 1990 will be influenced by future fertility patterns. For instance, assuming 2.8 births per woman in the child-bearing ages, 34% of the population will be under 18 in 1990 and the median age will be 30 years. However, if there are 1.8 births per woman in the child-bearing ages, 26% of the people will be under 18, while the median age will be 33 years, implying a sharp rise in the median age over its present level of 28 years.

Another major consideration in long-term national health planning is the continuing urbanization of the United States population. Metropolitan Areas (that is, areas with a population of 100,000 or more) are being inhabited by an increasing share of the nation's peoples. In 1960, 66% of the United States population lived in Metropolitan Areas; by 1970, this had increased to 71%; in the year 2000, a projected 85% of the United States will live in Metropolitan Areas. Even more impressive is the projected population growth for Great Metropolitan Areas, that is, Metropolitan Areas with over one million people. In 1960 there were 23 Great Metropolitan Areas with a total of 38% of the United States population. Ten years later the number of these urban conglomerates rose to 29, containing 44% of the United States population. It is projected that by the year 2000 there will be 50 Great Metropolitan Areas containing as much as 65% of the nation's population. This urban concentration of population will require careful planning of highly complex facilities with detailed attention to physical location if the people are to have access to the appropriate and needed health services.

Need and Demand

The concepts of want, need, demand, and use are often subtly interchanged in considering what service capacity we should have for future health care. As a people, we place high value on health and want ready access to the best care that is technically possible with little regard to cost. Yet in most of medicine there is little consensus as to what kind of care by whom is needed to maximize the chance for health. Assessing what people are willing and able to

pay for, technically termed demand, seems a more pragmatic concept, but in medical care this is heavily influenced by what the provider recommends and what third parties will cover. Thus it is customary to resort to analysis of observed patterns of use as the basis for projecting assumed future "need" and "demand."

While we find no readily workable alternative to basing future plans on current use, the limitations of this compromise must be kept in mind. For example, the demand for tonsillectomies has persisted long after it has been widely concluded that the procedure is rarely needed (or indeed of any benefit). Similarly, review of the most common diagnoses made in doctors' offices suggest that much of what is now conventionally handled by phsicians is likely to be as effectively dealt with by less costly providers of care. A major concern with national health insurance policy must be to avoid perpetuating the customary by simply paying for it without assessing whether it has become antiquated, ineffecient, or ineffective. Development of our national health policy should thus include a major continuing effort to improve our societal consensus on needs and to modify use patterns accordingly, through economic incentives and education.

We have examined current rates by age, sex, and race for physician visits and in-patient days in short-stay hospitals. Physician visit rates are higher overall for females (except in early life) and for whites (except in late life), with the highest rates appearing for women in the child-bearing age and for both sexes under five or over sixty-five. Although women in the child-bearing age have higher hospitalization rates than comparably aged men, overall males and

and non-whites tend to have longer and more frequent hospitalizations than females or whites. While it seems unlikely that differentials in use by race will persist over two or three more decades, the age and sex composition of the future population is likely to remain a major determinant of service use.

The paper by Gillings et al presents a series of tables which provides estimates for the current pattern of demand for medical care made by a Standard Million persons in the United States. These tables are based on population data from the Bureau of the Census and medical care utilization data from the National Center for Health Statistics. The Standard Million method allows national or regional estimates for the total demand for medical care services to be derived by multiplying the table entries by the number of millions of persons residing in the geographic area in question.

The top twenty specific diagnoses were also tabulated, and it was found these accounted for over half (53.8%) of the physician visits generated by the Standard Million. About 17% of all physician visits relate to prenatal care and medical and surgical aftercare. A further 15% of physician visits concern diseases of the respiratory system. Hence nearly one third of all diagnoses relate to a small number of problems. An analysis of principal complaints confirms this conclusion. Over one quarter (28.2%) of these were classified as "nonsymptomatic." A further one in eight (12.6%) may be classified as musculoskeletal and one in ten (10.2%) as respiratory. There is a strong possibility that a substantial proportion of these common problems could be handled by non-physician primary care practitioners.

The Standard Million's demand for inpatient care can similarly be used as a guide to estimating facility requirements and manpower needs in various specialties. On the average, every seven persons generate one discharge per year from a short-stay hospital, and each discharged patient stays in hospital nearly eight days. Hence the average person generates approximately 1.2 bed-days per year in short-stay hospitals. Nearly one in ten bed-days (9.5%) relate to neoplasms and just under one in seven (15.4%) are associated with diseases of the circulatory system. Over 11% are concerned with injuries and other adverse external effects.

Tables have also been prepared projecting overall service demand for the years 1990 and 2000. These projections, with allowances for a likely range in interim birth rates, are based on the assumption that current utilization rates will prevail through the end of the century. It is likewise assumed that factors increasing service demand (such as new ways of treatment and better access and financing) will be roughly balanced by factors decreasing demand (such as utilization review and more effective and efficient treatment procedures). While there is no compelling logic in assuming such a balance, neither are we able to find any convincing basis for projecting any net increase or decrease in service use. On these bases it appears that the year 1990 national medical care demand will probably approximate 1.22 billion physician visits and 287 million bed-days per year. The comparable projections for the year 2000 are 1.35 billion physician visits and 329 million bed-days.

There appears to be sufficient constancy over time in the use of medical services to make these projections helpful in considering future facility and manpower requirements. Yet it is important to bear in mind ways in which patterns of service use seem likely to change. Ailments arising from the ways people live increasingly influence their health concerns, creating a "new morbidity" and calling forth a "new perspective" on the tasks of the health care system. Durfee's paper argues that different ways of classifying disease problems are thus required in order to integrate psychosocial factors with physical illness and to allow for services more appropriately responsive to human needs. This would engender an increasing emphasis on health education shaping "demand" to conform more closely to "true need." It thus may well be that an increasing portion of the time of health professionals in the next quarter century may be spent in the interface of medical concerns with other health-related problems of our time.

Manpower

The federal government has become heavily involved with problems in the total supply and the specialty and geographic distribution of health personnel. Federal policy since 1963 has primarily been directed at increasing the supply of health personnel, and such efforts have been highly successful. For example, medical school enrollment jumped from 35,833 to 53,554 between 1968 and 1974. The population/physician ratio is projected to move from 634:1 in 1970 to 415:1 in 1990, and conceivably to 340:1 in 2000 if the projected 1985-1990 growth continues. Other types of personnel have registered rapid growth also, and it is expected that the number of allied health

personnel will continue to increase at even faster rates than physicians and other professionals. The number of formally trained allied medical personnel per physician is expected to grow from 1.72 in 1970 to 2.25 in 1990.

It is not clear, however, that these increased numbers of personnel are now or ever were "needed." Measuring "need" for personnel is a highly imprecise art. The federal costs of producing these personnel have been high, about $1.4 billion in 1974, and the federal government now finances about 50% of the cost of health personnel education. Since many providers are able to stimulate demand for care and/or have substantial control over prices, the economic impact of increased numbers of personnel on consumer health expenditures is also immense. Health expenditures as a percentage of GNP continue to increase, from 5.9% in 1965 to 8.3% in 1975. It is difficult to justify further large increases in numbers of health professionals, particularly given the economic consequences. Compensating benefits in terms of improved health status have not been established.

Foreign medical graduates are providing a large portion of the increasing supply of physicians, and currently over one-fifth of practicing physicians are FMGs. Given the needs of other countries for physicians and the adequacy of the supply in our own country, continued entry of FMGs into the United States physician supply at the rate of over 8,000 per year (1973) should be discouraged.

Recently, federal attention has turned toward the specialty and geographic distribution of health personnel. A variety of programs are underway or in planning for the purposes of supplying

more primary care providers, particularly in rural and inner city areas. There is a danger that such programs are being oversold, as social and economic constraints resulting in specialization and urbanization of services cannot be overcome with several relatively small, piecemeal programs. The specialty and geographic distributions of physicians are unlikely to change substantially, even by the turn of the century. Nevertheless, the pluralistic program approach can result in improved availability of primary care in the most severely deprived areas.

Several factors, termed 'manpower modifiers," will alter health care personnel requirements in the future. The development of physician extenders and other new types of health workers will provide less expensive alternatives for primary care service delivery. Population trends, licensing laws, technology, and organizational and financial characteristics of the health care system will alter requirements for the types of personnel currently being trained. Foreseeable changes in these areas do not contradict the conclusion that growth rates in the health professional supply should be lessened.

Technology

From basic research to implementation, new medical technology provides a myriad of potentially attractive possibilities for the investment of time, energy, and money. The decisions as to which of these possibilities will be invested in are fraught with uncertainty, however. At the point of development of new technology, an investment in basic research is always a gamble on the unknown. Once a breakthrough has been made, there is likely to be a rush into similar

endeavors, many of which will prove to be fruitless modifications of the original idea, a few will be genuine improvements. At the point of application of new technology, it happens very frequently that a new form of diagnosis or therapy gains widespread use before its net benefit has been documented. This is especially likely to occur if the new method has a low probability of having any dangerous side effects on patients. For the most part, the cost of a procedure no longer offers an effective deterrent to its use because the immediate cost is passed on to a third party payer. Thus physicians, acting in their traditional role of doing everything possible for each of their patients will very frequently order a test or prescribe a treatment offering some small chance of help but minimal chance of harm, regardless of the expense. This, of course, results in inflation.

Three major examples are presented as illustrations of the types of problems raised by new technology.

The first major example consists of coronary arteriography and coronary bypass surgery, which are considered together because the decision to do the first usually implies a willingness to perform the second. Each year about 150,000 Americans aged 35-65 die of coronary artery disease, causing great personal and financial loss to their families. Currently, the only way of detecting these patients with certainty is by coronary catheterization. At currently acceptable mortality rates for this procedure, screening the population at risk for coronary disease would cause thousands of deaths a year. Even assuming that we had a perfect way of detecting these 150,000 persons, operating on them would cost $1.5 billion

annually. Furthermore, it is by no means clear how many years we would have to wait before the number of active, pain-free years gained due to the surgery would equal the number of such years lost due to operative mortality.

The second major example is hemodialysis. This is an example of a situation in which many lives can be maintained by rather expensive mid-level technology. Some of these lives are active and comfortable, in spite of rather rigid dietary and dialysis routines. Others are filled with frequent complications, hospitalizations, and depression. In terms of the cost and numbers of patients involved, the situation is analagous to an interest problem in which a commitment is made to put aside a certain number of dollars a year. Inflation will reduce those dollars by a certain percentage every year, but at the end of twenty years we are likely to have many more dollars than we started with. Similarly, we are committed to care for a certain number of new dialysis patients each year, and death will reduce the total number of patients by a certain percentage every year. Based on current estimates of the death rate and number of new cases annually, we find that, in the absence of new technological breakthroughs, our long-term commitment to the dialysis program is in billions of dollars, if we reach those to whom we are committed.

The third major example is the computed tomographic scanner. This exciting new device, the function of which is explained in the paper, offers the certainty of a diagnostic breakthrough in neurology and the promise of breakthroughs in other areas as well. For neurological use it has the potential to spread beyond situations

in which it is cost-effective or even necessary. Any attempt to limit its spread cannot be made without considering the effect this would have on the distribution and practice of neurologists and neurosurgeons. For non-neurological uses, the machine will clearly spread very rapidly, outstripping its documented effectiveness. This may demonstrate the ability of our system to adopt a new technological breakthrough quickly in spite of a high initial cost ($400,000 to $585,000 per machine). On the other hand, it may merely demonstrate the ability of our system to spend a lot of money very quickly on a marginally effective machine or one that will be used in many marginal situations.

There are no quick and easy answers to the problems raised by new technology. However, two major points which may offer clues as to how to undertake the arduous tasks of evaluating the effects of new technologies and ultimately choosing between them are suggested. First, methods of evaluating the effects of technology already exist, so that applied medical science research can provide the kind of information on which decisions should be based. The specific methods involved include the fact that the value of a new diagnostic test must be viewed not simply as its ability to separate normal from abnormal, but its ability to discover patients who can ultimately be helped given the current capabilities for treatment. Thus, the relevant cost in dollars of a strategy of diagnostic tests and therapeutic maneuvers is the average cost per patient ultimately improved. The relevant cost of an additional test within a system of diagnosis and therapy is the marginal cost of improving one more patient due to the addition of this test. Careful analysis of many diagnostic and therapeutic procedures currently used in such a fashion

will undoubtedly show some which ultimately harm more patients than they improve. Mortality is only a crude outcome measure of the relative effects of diagnostic and therapeutic strategies and must be supplemented by measures of comfort and function, which though less exact, are of crucial importance. Even though many methods of evaluating technology already exist, their application is not now adequately coordinated.

The second major point is that, since the restraints imposed by a market are largely lost for medical care, under National Health Insurance some form of economic decision-making will have to take place in order to restrain inflation. It is probable that any task force, charged with the responsibility for recommending action on any medical problem, must recommend in all good conscience that more money be spent. To do otherwise would be to recommend ignoring a constituency of the suffering, no matter how large or small. Choices between these constituencies can only be made at a level responsible for them all. The challenge will be to establish a decision-making forum, supported by and capable of funding epidemiological and applied medical science research, but by no means consisting entirely of epidemiologists or medical scientists, which is obligated to publicize both its decisions and the evidence on which those decisions are based. The raw data of that evidence, as well as the manner in which it was collected, must be available for scrutiny and reanalysis by the scientific community in particular and by the American people in general.

Medical Care Facilities

Today the hospital is the scientific and technological hub of the medical care system and in 1974 accounted for the largest single portion (39%) of the dollars spent on health care.

In 1973 there were approximately 904,000 non-federal acute general care hospital beds in the United States or an average of 4.3 beds per 1000 population. Though the distribution of these beds varies from state to state between 6.5 per 1000 population in North Dakota and 2.1 per 1000 in Alaska, the distribution of these beds nationally has become more evenly balanced over the years due to a variety of factors, including the Hill Burton Program.

Since the enactment of this program in 1948, nearly $12 billion has been spent on hospital construction and modernization of which approximately $3.6 billion came from the federal government. While there has been a shifting emphasis in recent years from construction and expansion to modernization of existing facilities, current expenditures are approximately $4 billion annually and are expected to grow to $5 billion by 1980.

A primary consideration in the growth of expenditures for hospital facilities is not, however, the initial capital outlays for construction, but rather the total operating and maintenance costs over the lifetime of the facilities, costs generated by their utilization, and the costs attributable to excess capacity.

1. It has been estimated that cumulative operating costs of hospital facilities equal the initial capital investment in from one to three years. Stated another way, between $300,000 and $400,000

in operating costs per year are added to the community for each $1 million in new construction.

2. Our national experience has shown that the addition of health care facilities has not brought costs down. On the contrary, when facilities, equipment and/or personnel have been added, their utilization has adjusted to the increase in their availability and the fees and charges have risen accordingly. To paraphrase Parkinson, work expands to fill the space available for its performance and at a higher price.

3. The average occupancy for short-term community hospitals in 1974 was 75.4%. For hospitals with fewer than 100 beds the average occupancy was 64%. The occupancy rate at which hospitals operate is an important determinant in the total cost of medical services. Low occupancy is expressed in higher average costs per patient day and as an unwarranted use of capital resources. Furthermore, excess capacity is an invitation to utilization. In 1973 it was estimated that the average annual cost of an unused hospital bed was $18,250 and that as much as $1.5 billion per year could be saved nationally by eliminating the excess beds and their support facilities without having more than a negligible impact upon the probability of turning emergency patients away as a result of overcrowding.

4. In addition to the excess bed capacity nationally, there is a consensus among health care authorities that an estimated 25% of the patient population could more appropriately and efficiently be treated in other less expensive facilities. This is due to the health care system being oriented toward treating the acute phase

of illness rather than offering a complete spectrum of health care by providing available alternatives to acute care, financing the alternatives, and educating physicians and patients in the acceptance of these alternatives.

An HEW cost of effectiveness analysis completed in 1968 projected that a better matching of hospital patient needs with facilities services would result in 81.7 million short-term general hospital days being transferred to alternative health facilities with an estimated savings of about $3 billion in 1970 health systems operating costs. It has been estimated that 240,000 acute general care beds could be eliminated if suitable alternatives were available.

Despite considerable attempts on the part of government to deal with the issues of how to ensure the availability and accessibility of high quality, comprehensive health services to the American people at a cost we can afford, the United States Congress has stated (PL 93-461) that

> the massive infusion of Federal funds into the existing health care system has contributed to inflationary increases in the cost of health care, and failed to produce an adequate supply or distribution of health resources. The many and increasing responses to these problems by the public (Federal, State and Local) and the private sector have not resulted in a comprehensive, rational approach to the present - (a) lack of uniformly effective methods of delivering health care; (b) maldistribution of health care facilities and manpower; and (c) increasing cost of health care. Increases in the cost of health care, particularly of hospital stays have been uncontrollable and inflationary, and there are presently inadequate incentives for the use of appropriate alternative levels of health care, and for the substitution of ambulatory and intermediated care for hospital care.

While the government is employing a variety of strategies to deal with these problems, including the passage of the National Health Planning and Resources Development Act (Public Law 93-641, January 4, 1974) and consideration of a number of proposals for national health insurance, these strategies though far removed from our history and tradition of laissez faire, are patterned after the previous attempts which relied on self-control and voluntarism, and which obviously failed.

Any efforts to deal with these problems therefore, which do not provide effective mechanisms of dealing with the countervailing forces of American ingenuity, resourcefulness, self reliance, parochialism and political savvy must be predestined for, at best, only marginal effectiveness.

The following considerations are therefore proposed as guidelines for a national policy on medical care facilities construction and are intended to help the voluntary system work. The alternative is direct Federal regulation.

1. A national moratorium should be placed on all new federal financing for construction of acute general care hospital facilities. This should apply to all direct capital financing including grants, loans and interest subsidies, and indirect financing by excluding any costs attributable to such construction from the operating expense reimbursements by any program supported in whole or in part by federal funds.

2. State and regional planning agencies should have adequate and continuous funding to enable them to obtain the professional expertise and data to deal on at least an equal basis with the private

institutions. Historically, these agencies have been grossly overmatched and outclassed in all categories by the private sector. In addition, decisions rendered by these agencies should have binding authority on those who control the source of funds or continue to be financially impotent.

3. Specific uniform guidelines and criteria for assessing regional needs for health care facilities and resources should be developed by the federal government for use by state and regional planning agencies.

4. State and regional agencies should be mandated to develop plans which provide for integrated and progressive health care delivery systems including acute care, chronic and extended care, home care, and ambulatory and emergency care. Facilities could then be designated and licensed regionally to provide a specific level and range of services and to ensure an integrated system, avoid unnecessary duplication of facilities and services, and promote efficiency. Reimbursement from federal funds could be predicated upon this designation and licensure.

5. State and regional agencies should assess existing facilities and services and make recommendations for the elimination, consolidation or conversion of those that are under-utilized, duplicated and inefficient. After allowing a sufficient time to correct the conditions identified, operating support for these facilities and services from any federal funds could be withdrawn where appropriate.

6. Financial incentives in the form of grants, loans, subsidies and operating expense reimbursement could be provided for the elimination, consolidation, conversion or modernization of under-utilized,

inefficient or obsolete facilities in accordance with the recommendations of the state and regional planning agencies. Institutional cooperation rather than competition should be encouraged regionally.

Organization

The United States enjoys an international reputation for its management skills and leadership in developing management for complex economic enterprises. Yet, it is only a slight exaggeration to characterize medical care in the United States as "a large complex cottage industry." Despite extensive management expertise, the United States has not, as yet, found an acceptable mechanism with which to deal with the public dissatisfaction or the growing costs.

The inefficiency and ineffectiveness of health care delivery stem from a number of organizational dilemmas. The basic purpose of an organization is to accomplish a given goal or set of goals. Once the tasks are defined that will work toward fulfilling the goals, the personnel and the structures needed to perform the tasks can be identified. Control and information mechanisms are then developed to assure that the organization performs efficiently (maximum utilization of resources with high productivity and low cost) and effectively (goal achievement with consumer and worker satisfaction). Forces in the environment act on all three components separately or collectively and may provoke change. The problem with the health care system is that the goals, structures, and personnel roles are ambiguously and inconsistently defined.

The goals of the health care system and of many health care institutions are broad and vague, and may even be conflicting. Thus it is not clear whether personnel and structure should be directed

at providing health care, inpatient medical care, outpatient medical care, research advances, or education. Policies aimed at incorporating the latest technological advances into routine patient care may be contrary to policies directed at maximizing utilization of scarce resources and offering well established basic technologies to as many citizens as possible.

The roles of providers are ambiguous and overlapping. In attempts to improve the availability of care, more personnel and new types of personnel have been trained. Yet lacking a clear statement of the responsibilities of each type of personnel, many persons have been trained for jobs which did not exist, others have been over- or under-employed, and a full range of medical care services is still not available to all persons in all geographic locations. The same concepts apply at the macro level to the roles of institutions: a proliferation of highly-equipped, under-utilized general hospitals reflects the same lack of role definition.

The structure of most medical care organizations is highly complex and diversified without the necessary integration. Administrators worry about costs and occupancy rates; physicians concentrate on high-quality patient care and utilization review committees; nurses focus on social support structures and the staffing demands.

Finally, the goals, structures, and personnel are not well coordinated, and no single organization or group has ultimate control. Thus, the parts of the organization operate separately, and at times, poorly. Critical to this problem is that provider performance criteria, patient-satisfaction criteria, and managerial efficiency and cost criteria are determined by different factions. Administrators

responsible for the efficient use of resources do not have authority over those professionals who provide services. Repsonsibility and accountability in the medical care field are evasive.

External forces have attempted to control the outputs and performance of the health care system by impinging on a specific aspect of the organization. The federal government, for example, has sought to improve efficiency by setting ceilings on reimbursement amounts. As government and third party payors have tried to combat the vagaries of accountability, responsibility, and authority, they have increasingly insisted upon more forms, more rules, and an escalation of bureaucratic red tape. Such efforts have failed because they have not focused on the system as a whole nor on the components where change was most needed and thus they have not addressed the fundamental source of the problems.

There are, of course, outstanding exceptions to these generalizations. Group medical practice, initiated and more widely developed in this country than elsewhere, and prepaid group medical practice are distinctive marks of leadership. Group medical practice, since its beginning by the Mayo brothers, grew slowly for many years, but has been flourishing in recent years and will undoubtedly become more significant in the future because of its ability to specify and integrate both the tasks and the providers of medical care.

Prepaid group medical practice, which began in professional and legal controversy, is the most advanced form of organization in terms of encompassing all of the critical components of health care delivery.

Prepaid groups have demonstrated reasonable assurance of accessibility and availability of quality medical service to the members, cost restraint, and effective utilization of personnel. Despite this record, the percent of the population covered by such plans has remained relatively small.

In contrast, recently, the disorganized intrusion of the government into medical care has grown considerably. Promotion of public health and safety was delegated by the writers of the Constitution to state government. Many of the early health functions, such as sanitation and communicable disease control, were assumed by county government. The federal government entered the health field through incentive grant funds and constitutional responsibility for inter-state commerce. Broad national programs such as Hill-Burton, Medicare, and Medicaid have added new burdens to state and local jurisdictions, while at the same time resulting in a proliferation of federal regulations. The multiplicity of local, state, and federal laws mandating agencies to perform specific functions has developed into an extraordinary maze raising unnecessary and difficult barriers to assessment of program performance and to location of accountability for outcomes.

A consideration of these issues has led us to the following conclusions:

1. A national policy specifying goals and setting priorities of the health care system must be developed.

2. The functions of the medical care team and the role of each type of personnel should be clarified. Training programs, planning, licensing, and other manpower policies should be related to and derived from the explicit roles of the medical care providers.

3. The functions and roles of institutions should be defined. The division of tasks and the relationship of one institution to another should be established.

4. The regionalization of health care services, including personnel, institutions, and training should be planned and implemented in order to avoid duplication and inefficient utilization of scarce resources.

5. The role of local, state, and federal government should be re-examined. Authority and responsibility should be clearly established. Duplication and conflict between agencies should be eliminated.

6. Performance standards, directly related to goals, should be established for providers and institutions.

7. Consumers, as well as providers, should be given an opportunity to affect health care delivery. Direct financial contribution is a mechanism suggested to achieve this.

8. Clear lines of authority, accountability, and responsibility should be developed within individual institutions and among the many organizations. Those who have control of the utilization of resources and those who control the input and payment for resources must coordinate their efforts. Those who have the responsibility for resource utilization should bear some, if not all, of the responsibility for fiscal management.

Financing

The growing awareness of the world's finite resource capacity and the consensus that some form of national health financing will

be enacted in the immediate future poses some unusually difficult public policy questions.

If health care or medical care is to be the right of every American at a socially acceptable cost, the national objective requires a statement of precision. Health care and medical care are not synonymous; the personnel required, the organization of the system and the financing require entirely different approaches. To assume, if the government provides national financing and brings about a more equitable distribution of currently trained personnel, that health care will be the right of every American citizen does not appear valid.

The infusion of additional funds, either public or private, without a clear objective and carefully conceived plan will almost certainly continue the inflationary spiral of the past.

The following unusual characteristics of the medical care market require careful scrutiny before decisions on the scope of services, the organization and the financing of the services are made.

1. Supply, of either personnel or physical resources, in the medical care area tends to create its own demand.

2. Physicians and other personnel either directly control or substantially influence the range of services once the patient seeks the initial visit.

3. Physician cost is largely fixed; the only significant variable is physician net income. In a highly personal service such as medical care, there are clear limits, consistent with quality, to the most efficient use of this high fixed cost. Well-organized group practice appears to offer the most potential.

4. Hospital care is also a fixed cost enterprise, with most of the cost in personnel. To reimburse a fixed cost economic unit with "cost reimbursement" provides little or no incentive for cost containment or for restraining the addition of excessively expensive and usually underutilized new services.

5. The financing of services on a categorical basis, i.e., by hospital care, extended care, physician office care, physician hospital care and by disease tends to distort not only training programs preparing personnel but also the utilization of services without adequate regard to the appropriateness or necessity.

6. There is no single individual or group of individuals accountable for the responsibility and the authority for the effective and economical use of institutional medical care. The board of trustees and the hospital director, at least on the organizational chart, are theoretically in charge. However, the skills, working patterns and desires of the hospital medical staff in the long run determine the scope of services to be offered and the staffing patterns which largely establish the hospital cost.

7. The course of medical treatment is a matter of clinical judgement in addition to objective fact.

8. The physician's self image as "healer" and the public expectation of the physician as "healer" presents to the physician a vast array of problems for which the physician may be ill equipped and for which there may be no adequate remedy in a society filled with social discontinuities.

9. Finally, the human capacity to absorb medical care appears to be splendidly elastic. This is especially true when the responsibility for the payment and the cost are sufficiently removed from the individual.

The following points should be addressed in consideration of national financing system:

1. The objective of national financing should be clearly spelled out, whether it is to be health care or medical care. Counseling and support services to assist people in coping with the stresses of our society appear incompatible with current fee-for-service financing arrangements.

2. A national health policy group, probably best organized and serving the Congress, appears essential. If, as is reasonably apparent, the supply of physicians and hospital beds creates its own demand, those responsible for financing cannot constrain cost unless and until they can influence the supply and distribution of personnel.

3. History, in the United States and elsewhere, would clearly indicate that irrespective of whether insurance is financed privately or publicly, the consumer becomes increasingly uninvolved in cost as the burden is placed on either the employer/employee relationship or government. In an effort to insure broader public participation in any future system, financial participation would appear to be a prerequisite. Financial participation by the consumer should be carefully structured in order to insure that the poor are not denied needed services and that preventive services are available without monetary barriers.

4. Capitation payments including all physicians' services, hospital and extended care service, and facilities construction should be widely available on a regional basis and should be encouraged.

5. The current payment system should be carefully and critically re-evaluated to insure the payment system does not stimulate inequitable payments for services either by specialty or geography.

6. Institutional payment to hospitals or extended care facilities on a cost reimbursement basis is an anachronism unless the scope of services is constrained by some public body.

7. The individual with most of the authority, the doctor, is and should be fiscally accountable for his action.

WORKING PAPERS

U. S. POPULATION GROWTH TO THE YEAR 2000

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U.S. POPULATION GROWTH TO THE YEAR 2000

[1]The United States population, including armed forces personnel and dependents overseas, numbered about 213,257,000 as of May 1, 1975, according to recent U.S. Census Bureau statistics released in June, 1975. This was a 0.8% increase (1,623,000 people) over the estimate for the corresponding month the previous year, and an increase of 8,923,000 over the April 1, 1970, population.

Assuming an average of 2.1 births per woman in the child-bearing ages of from 15-44 between now and the year 2000[2], there should be somewhere near 264,430,000 Americans at the turn of the century, or an increase in the population of 35.9% over the 1973 figure. Table 1 shows the range in total population increase from 1973 to 2000 is projected to be between 19%(Series F) and 43%(Series C).

For the purpose of this paper we have chosen to accept the 2.1 figure for the average number of births per woman in the child-bearing ages (Series E), but the other three series or projections made available by Census Bureau statisticians are listed here for comparison, as no one is yet privy to an accurate crystal ball: Series F assumes 1.8 births per woman; Series D, 2.5 births; and the highest projection, Series C, 2.8 births per woman.

Population experts at the National Center for Health Statistics[3] stated in January of this year that the fertility in 1973 of U.S. women, 15-44, was the lowest ever observed in this country. It was then 69.2 births per 1,000 women in the fecund age category, or 44% lower than in 1957. This trend in progressively lower birth rates for the U.S. is supported by May 1975

Table 1

Total Population: United States, 1970 to 2000

(Total population including Armed Forces overseas)

Year (July 1)	Series C	Series D	Series E	Series F
Estimates (thous.):				
1970	204,879			
1973	210,404			
Projections (thous.):				
1975	215,872	215,324	213,925	213,378
1980	230,955	228,676	224,132	221,848
1985	248,711	243,935	235,701	230,913
1990	266,238	258,692	246,639	239,084
1995	282,766	272,211	256,015	245,591
2000	300,406	285,969	264,430	250,686
Percent increase:				
1973-1975	2.6	2.3	1.7	1.4
1975-1980	7.0	6.2	4.8	4.0
1980-1985	7.7	6.7	5.2	4.1
1985-1990	7.0	6.0	4.6	3.5
1990-1995	6.2	5.2	3.8	2.7
1995-2000	6.2	5.1	3.3	2.1
Percent increase since 1973:				
1975	2.6	2.3	1.7	1.4
1980	9.8	8.7	6.5	5.4
1985	18.2	15.9	12.0	9.7
1990	26.5	23.0	17.2	13.6
1995	34.4	29.4	21.7	16.7
2000	42.8	35.9	25.7	19.1

Source: U.S. Bureau of the Census, Current Population Reports, "Estimates of the Population of the United States, by Age and Sex: April 1, 1970 to July 1, 1972," Series P-25, No. 490; and ibid., "Projections of the Population of the United States, by Age and Sex: 1972 to 2020," Series P-25, No. 493; and ibid., "Estimates of the Population of the United States to August 1, 1973," Series P-25, No. 506.

Taken from Current Population Reports; Special Studies, "Population of the United States; Trends and Prospects: 1950-1990," Series P-23, No. 49, May 1974, page 175, U.S. Dept. of Commerce, Social and Economic Statistics Administration, Bureau of the Census

statistics published by the same source[4]. The fertility rate was estimated then to be 69.3 births per 1,000 women, when seasonally adjusted. This leads to an estimate of 1.9 births per woman in the child-bearing ages for 1975. However, a recent California study by Sklar and Berkov[5] suggests that the trend of falling birth rates has "bottomed out" and that the nation may be in for an increase in the rate of births with a projected rise in fertility of 9% for the crude birth rate and 2% for the general fertility rate. The authors cite attitudinal studies and California and national birth statistics as indications that most women under 30 do not plan to remain childless and do, in fact, expect families of at least two children. Coupled with this is the fact that California and the U.S. have continued to experience increases in illegitimate births in spite of legalized abortion laws and practices. The two researchers also showed that the California general fertility rate rose by 2.3% to 66.3% in 1974 and that live births rose from 297,834 in 1973 to about 311,650 in 1974, notwithstanding the relatively gloomy national economic conditions so instrumental in lowering birth rates during the Economic Depression of the 1930s.

Hence the low figure experienced in recent years of 1.9 births per woman of childbearing age is not likely to be sustained and so an average of 2.1 births(Series E) seems a reasonable assumption.

Specific Projections For The U.S. Population

Another source of population increase is from international migration. This influx of people is projected to account for 1/4 of the population growth between now and the year 2000 under the assumption that there will

be a net immigration of about 400,000 per year until the next century.[6]

[7]The Western Region of the U.S., particularly the Pacific Division, is expected to have a more accelerated rate of population increase than the South, North Central or Northeast, and it is expected to contain an increasingly larger proportion of the country's population(Table 2). However, even by 1990, the West will still have less than 1/5 of the population--47,952,000 people--compared with the nearly 1/4 or more of the people who will live in each of the other three regions.

The 18-24 years old "youth" population is likely to experience a net decline[8](4%) between 1972 and 1990, but there will be fluctuations in the growth rate during the interim(Table 3). Their number will increase by 13% between 1972 and 1980 but then decline by 15% between 1980 and 1990, totaling about 25,029,000 by 1990(Series F). For those in the 25-44 age group the growth rate will be high and not so variable, at 24% in the first period and 26% in the next. Their total number in 1990 should be near 78,693,000(Series F). The older adult population of working age will grow very little between 1972 and 1990, while those over 65, "the aged", will increase in number by about a third. However, after 1990 the growth rate of the aged population is almost certain to decrease for a few decades, due to the drop in the number of births after 1920. Of course the age structure of the population in 1990 will be greatly influenced by future fertility patterns, as mentioned earlier.

Members of the work force[9] are expected to increase in number by almost 1/5 during the 1970's, from 85.9 million in 1970 to 101.8 million in 1980(Table 4). During the following 10 years the growth rate is expected to decline to only 11%, and so at this rate the labor force is expected to reach 112.6 million by 1990. To quote the authors of "Population of the

Table 2

Total Population of Regions and Divisions: United States, 1972 to 1990

(Numbers in thousands. As of July 1. Excludes Armed Forces overseas)

Regions and divisions	Series I-C			Series I-E		
	1972	1980	1990	1972	1980	1990
United States	208,230	232,964	266,883	208,230	226,634	250,630
Regions:						
Northeast	49,726	54,833	62,144	49,726	53,466	58,152
North Central	57,410	63,762	72,631	57,410	62,056	67,741
South	65,059	71,799	82,436	65,059	69,627	76,784
West	36,036	42,571	51,471	36,036	41,446	47,952
Divisions:						
New England	12,105	13,600	15,735	12,105	13,252	14,662
Middle Atlantic	37,621	41,233	46,409	37,621	40,246	43,470
East North Central	40,793	45,906	52,661	40,763	44,674	46,186
West North Central	16,617	17,856	19,940	16,617	17,385	18,555
South Atlantic	31,921	35,766	41,604	31,621	34,660	38,617
East South Central	13,196	13,794	15,130	13,156	13,440	14,100
West South Central	19,982	22,237	25,704	19,662	21,627	23,667
Mountain	6,880	6,903	11,766	6,680	6,617	10,694
Pacific	27,156	32,669	39,703	27,156	31,832	37,059

Source: U.S. Bureau of the Census, Current Population Reports, "Estimates of the Population of States: July 1, 1972 and 1973," Series P-25, No. 508, and ibid., "Preliminary Projections of the Population of States: 1975 to 1990," Series P-25, No. 477.

Taken from Current Population Reports; Special Studies, "Population of the United States; Trends and Prospects: 1950-1990," Series P-23, No.49, May 1974, Page 176, U.S. Dept. of Commerce, Social and Economic Statistics Administration, Bureau of the Census

Table 3

Population Changes by Broad Age Groups: United States, 1972 to 1990

(As of July 1. Total population including Armed Forces overseas)

Age	Series C			Series F		
	1972	1980	1990	1972	1980	1990
POPULATION (THOUS.)						
All ages	208,837	230,955	266,238	208,837	221,848	239,084
Under 5 years	17,242	23,449	27,149	17,242	16,827	17,752
5-17 years	51,622	46,250	82,825	51,822	45,766	44,868
18-24 years	26,005	29,382	25,029	26,005	29,382	25,029
25-34 years	27,353	36,962	41,791	27,353	36,962	41,791
35-44 years	22,773	25,370	36,902	22,773	25,370	36,902
45-54 years	23,591	22,406	24,617	23,591	22,406	24,617
55-64 years	19,104	21,083	20,357	19,104	21,663	20,357
65 and over	20,948	24,052	27,766	20,948	24,052	27,766
Median age	28.1	26.7	29.5	28.1	29.8	32.7
	1972-90	1972-80	1980-90	1972-90	1972-80	1980-90
PERCENT CHANGE						
All ages	27.5	10.6	15.3	14.5	6.2	7.6
Under 5 years	57.5	36.0	15.8	3.0	-2.4	5.5
5-17 years	20.6	-6.9	29.8	-13.4	-11.7	-2.0
18-24 years	-3.8	13.0	-14.8	-3.8	13.0	-14.8
25-34 years	52.8	35.1	13.1	52.8	35.1	13.1
35-44 years	62.0	11.4	45.5	62.0	11.4	45.5
45-54 years	4.3	-5.0	9.9	4.3	-5.0	9.9
55-64 years	6.8	10.4	-3.4	6.8	10.4	-3.4
65 and over	32.6	14.8	15.4	32.6	14.8	15.4
	1972	1980	1990	1972	1980	1990
PERCENT DISTRIBUTION						
All ages	100.0	100.0	100.0	100.0	100.0	100.0
Under 5 years	8.3	10.2	10.2	8.3	7.8	7.4
5-17 years	24.8	20.9	23.5	24.8	20.6	18.8
18-24 years	12.5	12.7	9.4	12.5	13.2	10.5
25-34 years	13.1	16.0	15.7	13.1	16.7	17.5
35-44 years	10.9	11.0	13.9	10.9	11.4	15.4
45-54 years	11.3	9.7	9.2	11.3	10.1	10.3
55-64 years	9.1	9.1	7.6	9.1	9.8	8.5
65 and over	10.0	10.4	10.4	10.0	10.8	11.8

Source: U.S. Bureau of the Census, Current Population Reports, "Estimates of the Population of the United States, by Age and Sex: April 1, 1970 to July 1, 1972," Series P-25, No. 480; and Ibid., "Projections of the Population of the United States, by Age and Sex: 1972 to 2020," Series P-25, No. 493.

Taken from Current Population Reports; Special Studies, "Population of the United States; Trends and Prospects: 1950-1990," Series P-23, No.49, May 1974, page 178, U.S. Dept. of Commerce, Social and Economic Statistics Administration, Bureau of the Census

Table 4

Annual Average Labor Force Participation Rates, by Age and Sex: United States, 1970 to 1990

(Includes all Armed Forces)

Age and sex	Estimates		Projections		
	1970	1972	1980	1985	1990
MALE					
Total, 16 and over.....	79.2	79.7	78.0	78.3	78.4
16-19 years.....	57.5	59.9	56.0	55.5	55.4
20-24 years.....	85.1	85.9	83.0	82.5	82.1
25-34 years.....	95.0	95.9	94.6	94.4	94.4
35-44 years.....	95.7	96.5	95.1	94.9	94.7
45-54 years.....	92.9	93.3	91.9	91.7	91.5
55-64 years.....	81.5	80.5	79.1	78.1	77.5
65 and over.....	25.8	24.4	21.2	20.0	19.3
FEMALE					
Total, 16 and over.....	42.8	43.9	45.0	45.6	45.9
16-19 years.....	43.7	45.9	45.5	46.4	47.0
20-24 years.....	57.5	59.1	63.4	64.9	66.2
25-34 years.....	44.8	47.6	50.2	50.9	51.5
35-44 years.....	50.9	52.0	53.2	54.4	55.2
45-54 years.....	54.0	53.9	56.2	57.4	58.0
55-64 years.....	42.5	42.1	44.7	45.4	45.8
65 and over.....	9.2	9.3	8.6	8.5	8.3

Source: Denis F. Johnston, 1973, "The U.S. Labor Force: Projections to 1990," Special Labor Force Report 156, U.S. Bureau of Labor Statistics; and U.S. Bureau of Labor Statistics, 1973, Employment and Earnings, Vol. 19, No. 7.

Taken from Current Population Reports; Special Studies, "Population of the United States; Trends and Prospects: 1950-1990," Series P-23, No. 49, May 1974, page 188, U.S. Dept. of Commerce, Social and Economic Statistics Administration, Bureau of the Census

U.S.; Trends and Prospects: 1950-1990," 'The projections assume no drastic changes in the propensity of the several population groups to seek work...(and) assume a generally favorable demand situation, together with the absence of major wars or other social or economic disturbances.' In their study they propose that 89% of the expected change in the male work force and 68% of the change in the female labor force will result from population changes, between 1970 and 1990. Only among men 65 and over and women 20 to 24 and 45 to 54 years old will the projected changes in worker rates have a greater effect on changes in the labor force than will changes in population. Current variations in the worker rates express a trend toward prolongation of training and schooling among the young, with a concomitant later entry into the work force. [10]It is projected that by 1990 there will be 112,576,000 men and women in the U.S. labor force, over half(58,148,000) of which will fall in the 25-44 years age group.

The median age of the work force, declining from 40 to 38 since the mid-60's, is expected to be 35 years by 1980. The percent of women workers went from 32% in 1960 to 37% in 1970, and is projected to be 39% by 1980. One reason[11]for this rapid increase in female worker rates was the decline in the birth rate. Labor force rates for females incline to be higher if women have two rather than three children--the former situation now becoming the characteristic size, according to the Census Bureau special study.

The female worker rates for ages 25 to 34, rising 36% in 1960 to 45% in 1970, is projected to rise by only five percentage points this decade to 50% in 1980. This expanding entry[12]of women into the work force could make it more difficult for "...the marginal age and educational groups and the handicapped to secure jobs." One notable feature in the projected

change in the total work force between 1980 and 1990 is the slower pace of growth, put at only 11% this decade. This is to be seen in the expected rise of the median age of the labor force from 35 years in 1980 to 37 years in 1990.

For the 65 years and older age group[13] the projection during the 1980's is for a slow but steady increase--7%--as the decline in worker rates for this group is more than offset by the rise in the underlying population of this age. Since the lower fertility levels seen in recent years is expected to continue, according to the Census Bureau study, the projections of population and labor force seem to "imply a much lower ratio of dependents than at present." This statement is supported by the projection that while in 1972 there were 35% more dependents than workers, by 1980 this dependency figure is expected to drop to 18 to 25%.

[14] From 1960 to 1970 Metropolitan Areas having 100,000 people or more (defined as "multinodal zones of continuous urbanization which appear destined to merge into functionally integrated entities similar to SMSAs") increased in population from 118.4 to 144.3 million. This was a gain of 26 million people, while rural and suburban areas of the nation dropped from 61.0 to 58.9 million, a loss of 2.1 million. However, this "loss" was entirely due to the addition of counties to existing Metropolitan Areas during the last decade.[15] Using the year 2000's projected Metropolitan boundaries, that is assuming a constant geographic basis, the population gain for the 1960-1970 period was 23.4 million in Metropolitan areas, while the remainder of the country increased by 0.5 million.

[16] In 1960 Metropolitan areas contained 66% of the nation's population, 71% in 1970, and by the year 2000(based on population trends of 1940-1970)

85% of the people. This means the rest of the nation will decline in population from 29 to 15% of the whole. The low projected growth rate for U.S. Metropolitan Areas is 1.25%.

Even more impressive is the projected population growth for Great Metropolitan Areas, that is Metropolitan Areas containing over 1 million people. [17]In 1960 there were 23 Great Metropolitan Areas, including such areas as Southeast Florida, Houston and the Los Angeles Region, with a total population of 68.2 million (38% of the U.S. total). Ten years later the number of these urban conglomerates rose to 29, containing 89.3 million people(44% of the U.S. total), and[18] there is a high projection that by 2000 there will be 50 Great Metropolitan Areas, containing 65% of the nation's people. The low projection is 44 Areas and 50% of the population.

The futurist Herman Kahn and A.J.Wiener, collaborating on a paper included as a chapter in "Toward the Year 200: work in Progress," printed in the summer, 1967, edition of Daedalus, Journal of the American Academy of Arts and Sciences, predicted these urban "mega-concentrations" will grow at a fantastic rate in the future and they described them as follows:

[19]"We have labeled them 'Boswash,' 'Chipitts,' and 'Sansan.' Boswash identifies the megalopolis that will extend from Washington to Boston and contain about one quarter of the American population(something under 80 million people). Chipitts, concentrated around the Great Lakes, may stretch from Chicago to Pittsburgh and north to Canada--thereby including Detroit, Toledo, Cleveland, Akron, Buffalo, and Rochester. This megalopolis seems likely to contain more than one eighth of the U.S. population(perhaps 40 million people or more). Sansan, a pacific megalopolis that will presumably stretch from Santa Barbara(or even San Francisco) to San Diego, should contain more than one sixteenth of the population(perhaps 20 million people or more)...These megalopolises should contain roughly one half of the total United States population,including the overwhelmin

majority of the most technologically and scientifically advanced, and prosperous intellectual and creative elements. Even Sansan will have a larger total income than all but five or six nations. Study of the United States in the year 2000 may largely be of Boswash, Chipitts, and Sansan."

[20]Pickard also proposes that Urban Regions, defined as a continuous metropolitan zone or system of Metropolitan Areas which may include a few enclosed or connecting nonmetropolitan counties, will contain 74% of the the U.S. population by 1980, and nearly 83% by 2000. This urban trend has grown rapidly since 1920, expanding and containing from 1/3 of the nation's population to around 2/3 in 50 years. Pickard adds that at the turn of the century 5/6 of the people will be living within 1/6 of our land area.

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CURRENT AND PROJECTED DEMAND FOR MEDICAL CARE SERVICES

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I. 1974 U.S. Standard Million

Table 1 shows the 1974 Standard Million that represents the population of the United States by age, race, and sex. For non-whites in the United States, the highest percentage of the population of both sexes is the 5-14 age group; for whites the highest percentage for each sex is the 15-24 age group, showing that the birth rate has decreased in recent years. There is an excess of women in the older age groups for both whites and non-whites.

II. Physician Visits

A. Number of Physician Visits Per Person Per Year

Table 2 shows the number of physician visits per person per year by age, race, and sex. From this table it can be seen that the general trend is for the most physician visits to be made by those aged less than five and by those in the older age groups.

Among females there is a rise in visits during the child-bearing years. Overall, whites make more visits than non-whites; females make more visits than males. Male visits tend to be high in the early years, are low until about age 45, and then begin to increase. Female visits drop in the 5-14 age group, increase during the child-bearing years, decrease slightly after that, and then tend to be high from 45 until the end of life. Racial differences tend to show a reversal in trend at about age 35. Before age 35, white rates tend to be higher; after 35, non-white rates tend to be higher.

B. Physician Visits for 1974 U.S. Standard Million

Table 3 shows the expected number of physician visits made by the U.S. Standard Million by age, race, and sex. The number of visits for each age-race-s specific cell was found by multiplying each cell entry in Table 1 by the appropriate rate in Table 2. The total number of visits for each sex-race group was

found by summing overall age groups. Similarly, the total number of visits for each sex was found by combining the visits of whites and non-whites. These two totals were then added to give the total number of visits for a Standard Million. This grand total was used to calculate the percentages shown for each cell. Females account for 58% of all visits and males 42%.

Children aged less than five generate 10.6% of visits but comprise only 7.7% of the population. Women aged 15-34 generate almost 20% of visits.

C. Distribution of Physician Visits Over Diagnoses and Complaints

The National Ambulatory Care Survey, May 1973-April 1974, provides data on physician visits classified by principal diagnosis and by principal complaint. Further subdivisions by each of age, race, and sex are available. The unit of study of this survey is an office visit to a physician. Usually the diagnosis is given by the physician, although in some cases the physician's diagnosis is recalled by the patient. One principal complaint is recorded for each office visit.

Table 4 shows the estimated number of physician visits for the 1974 U.S. Standard Million by principal diagnosis. Table 5 shows the information by primary complaint or symptom.

Calculations for Tables 4 and 5:

The total number of visits generated by the U.S. Standard Million and the subtotals for each age group, each race group, and each sex group were taken directly from Table 3 and are shown in the first row of each of Tables 4 and 5. The total number of visits generated by the U.S. Standard Million for each specific diagnosis or symptom, is shown under the "Total" column in each of Tables 4 and 5. The term "condition" is used to designate either a diagnosis or symptom. The following formula was used to carry out the calculations.

$$T_i = \frac{M \cdot D_i}{S} \qquad (1)$$

where i denotes the condition

T_i = total number of visits for i-th condition generated by 1974 Standard Million

M = number of visits for all conditions generated by 1974 Standard Million ($M = \Sigma T_i$)

D_i = number of visits for i-th condition from survey data

S = number of visits for all conditions from survey data ($S = \Sigma D_i$).

The National Ambulatory Health Care Survey does not give the number of visits for each demographic subgroup and for each condition but provides the percentage of visits attributed to each group for a particular diagnosis or problem. Hence, calculations for age, race, and sex by condition cells in Tables 4 and 5 (i.e., columns after the "Total" column) were made in the following manner.

Sex: Let j=1 denote males and j=2 denote females.

$$V_{ij} = \frac{D_i \cdot P_{ij} \cdot N_j}{S \cdot U_j} \qquad (2)$$

where V_{ij} = number of visits generated by j-th demographic subgroup of Standard Million, attributed to i-th condition

N_j = number of visits generated by j-th demographic subgroup of Standard Million

P_{ij} = percentage of visits made by j-th demographic subgroup of survey population attributed to i-th condition

U_j = percentage of visits made by j-th demographic subgroup of survey population.

The above formula also applies to racial subgroups (j=1,2), and age subgroups (j=1,5). In general, when the V_{ij}'s are summed over j

$$\sum_j V_{ij} \neq T_i \qquad (3)$$

as the sample for the Ambulatory Care Survey does not match the Standard Million exactly as regards demographic characteristics. It was decided that the V_{ij}'s should be adjusted so that they do sum to the T_i's. The procedure used here was to multiply each of the V_{ij}'s by correction factors, proportional to the differences $(\sum_j V_{ij} - T_i)$. The cell entries shown in Tables 4 and 5 are the adjusted V_{ij}'s, denoted by V_{ij}^*.

$$V_{ij}^* = V_{ij} - \frac{V_{ij}}{\sum_j V_{ij}} \left(\sum_j V_{ij} - T_i \right)$$

$$\text{i.e,} \qquad V_{ij}^* = \frac{V_{ij} T_i}{\sum_j V_{ij}} \qquad (4)$$

When more than one subgroup proportion was missing from the five survey age categories, a sixth category was created by taking the complement of the proportions for the age groups which were present. Missing proportions are denoted by *.

Table 6 shows the Number of Physician Visits for the 20 most frequent ICDA diagnoses for the 1974 U.S. Standard Million. The leading reasons for visiting a physician appear to be physical examination and other types of non-illness care.

D. Number of Physician Visits by Place of Residence

The 1970 Census categorizes a person's place of residence by urban versus rural and by inside or outside a Standard Metropolitan Statistical Area (SMSA).

Each of these terms is fully defined and further divided into well-defined sub-categories. If one wishes to examine the number of physician visits by place of residence, the urban versus rural classification may not be meaningful since a small township could be a short distance from a large medical complex which provides numerous services. Viewing a physician visit as taking place inside or outside a SMSA may help, although this approach will probably be misleading in some instances also.

The most recent information found on physician visits was in Series 10, Number 97 of the Vital and Health Statistics Publications by the National Center for Health Statistics. This publication gives a breakdown of physician visits by place of residence by defining a visit as taking place inside or outside a SMSA. The number of physician visits for persons within a SMSA is 5.2 per year. The number of visits for persons outside a SMSA is 4.4 (a larger difference is found if visits outside SMSA's are subdivided into farm and nonfarm subgroups).

The number of physician visits does not seem to depend on place of residence as much as it does on age and sex factors. Hence, place of residence has not been accounted for in the tables describing medical care demand by a Standard Million. However, it is recognized that some adjustments to estimates might need to be made if the estimates in the tables are to be applied to highly rural regions.

III. Hospital Discharges

A. Short-Stay Hospital Discharges Per 1000 Population Per Year

Table 7 shows the age-race-sex specific discharge rates for short-stay hospitals in 1973. The calculations were based on 1973 estimates of numbers of discharges for demographic subgroups and population size. The age-sex specific discharge rates are based on all the short-stay hospital discharge data, but the age-race-sex specific rates assume that the rather large (12.9% of total)

"color not stated" group has the same racial composition as the discharges for which race was known. These rates were then applied to the 1974 U.S. Standard Million, to obtain the number of discharges generated by the Standard Million. There is no evidence to suggest that hospital discharge rates would change significantly from 1973 to 1974 and so it is felt reasonable to apply 1973 hospital discharge rates to the 1974 Standard Million.

Calculations for Table 7:

First, calculate the discharge rates for the age-sex specific cells and the number of discharges for these groups.

Let i denotes sex: i = 1,2,3 (male, female, both)

j denotes age: j = 1,2,3,4,5 (15, 15-44, 45-64, 65+, all ages)

k denotes race: k = 1,2,3 (white, non-white, both)

Then

$$r_{ijk} = \frac{d_{ijk} \cdot 1000}{t_{ijk}} \qquad (5)$$

for i = 1,2,3

j = 1,2,3,4,5

k = 3

where r_{ijk} = number of discharges per 1000 persons, 1973 for i-th sex group, j-th age group, and k-th race group

d_{ijk} = number of discharges from short-stay hospitals, 1973 for i-th sex group, j-th age group and k-th race group

t_{ijk} = number of persons in U.S., 1973 in i-th sex group, j-th age group and k-th race group.

Next, calculate the r_{ijk} for k = 1,2, i.e., the age-race-sex specific discharge rates. If the "color not stated" group has the same racial mix as the remaining

discharges for 1973, then the total number of discharges for each k = 1,2 may be calculated as follows:

$$p_{ijk} = \frac{d_{ijk}}{d_{ijk} + d_{ijk'}} \qquad (6)$$

for $i = 1,2$

$j = 1,2,3,4$

$k = 1,2$

$k' \neq k$

where p_{ijk} = age-sex specific proportion of discharges for i-th sex group, j-th age group and k-th race group.

Apply the proportion p_{ijk} to the "color not stated" group to estimate a correction term. Each correction term will be added to the known number of hospital discharges for the corresponding age-race-sex specific group to give an estimate of total number of short-stay hospital discharges for the group.

$$c_{ijk} = m_{ij} \cdot p_{ijk} \qquad (7)$$

for $i = 1,2$

$j = 1,2,3,4$

$k = 1,2$

where c_{ijk} = correction term for i-th sex group, j-th age group and k-th race group

m_{ij} = number of discharges for i-th sex group and j-th age group with "color not stated".

The number of short-stay hospital discharges per 1000 persons for each age-race-sex specific cells is given by

$$r_{ijk} = \frac{(d_{ijk} + c_{ijk}) \cdot 1000}{t_{ijk}} \qquad (8)$$

for $i = 1,2,3$

$j = 1,2,3,4,5$

$k = 1,2$

Equations (5) and (8) define the entries in Table 7.

In general, the discharge rate for non-whites is greater than that for whites. Except during the child-bearing years, females have a lower rate than males; these differences are greater in non-whites than in whites. Because the rate for families is so elevated for the childbearing years 15-44 and slightly so for the ages 45-64, the overall rate for females is greater than that for males; again, the difference is more striking for non-whites than whites. For males, the rate increases with age, while for females, the rate increases rapidly for the 15-44 age group, drops only slightly for the 45-64 age group, and rises sharply again. Non-white females less than 15 years of age have the lowest rate, while white males 65+ years of age have the highest rate.

B. Hospital Discharges for the 1974 U.S. Standard Million

Two methods were used to derive Table 8.

Method i:

$$s_{ijk} = \frac{r_{ijk} \cdot n_{ijk}}{1000} \qquad (9)$$

for $i = 1,2$

$j = 1,2,3,4$

$k = 3$

where s_{ijk} = estimated number of discharges generated by i-th sex group, j-th age group and k-th race group of the 1974 U.S. Standard Million

n_{ijk} = number of persons in 1974 U.S. Standard Million, and in the i-th sex group, j-th age group and k-th race group.

The proportion of the row total of discharges which each age-race-sex specific cell represents is p_{ijk} as in equation (6). Multiply this proportion by the row total of discharges to give the number of discharges for each cell.

$$s_{ijk} = p_{ijk} \cdot d_{ij3} \qquad (10)$$

for $i = 1,2$

$j = 1,2,3,4$

$k = 1,2$

Equations (9) and (10) jointly define the entries that would be in Table 8 if method i were used. Following this protocol, s_{ijk} for $i = 3$ or $j = 5$ would be found by addition of the appropriate elements.

Method ii:

$$s_{ijk} = \frac{r_{ijk} \cdot n_{ijk}}{1000} \qquad (11)$$

for $i = 1,2$

$j = 1,2,3,4$

$k = 1,2$

The s_{ijk} given by equation (11) define the entries in Table 8. The s_{ijk} for the remaining cells ($i = 3$, or $j = 5$, or $k = 3$) follow by addition.

Both of the above calculations were performed to estimate the s_{ijk} and the two methods give very nearly the same results. This indicates that the distribution of whites and non-whites within the "color not stated" group is the same as in the remaining discharges, suggesting that the "color not stated" group arises from a random failure to report a patient's color. Table 8 presents the figures derived by the second method which is preferred for its directness.

C. Distribution of Hospital Discharges Over Conditions

Calculations for Table 9

The first row of Table 9, the overall total number of discharges for the 1974 U.S. Standard Million and subtotals for demographic subgroups for all conditions, is taken from Table 8. The overall total (153040) is distributed over the specific conditions according to the proportions of discharges attributed to these conditions by the NCHS publication "Inpatient Utilization of Short-Stay Hospitals" cited at the foot of Table 9. This gives the row totals listed in the first column of Table 9. Adjustments were made, on a pro rata basis, such that the subtotals sum to the established overall total. Details of these calculations are given in equation (4). The individual cells of Table 9 divide the condition subtotals into entries which describe the number of discharges generated by demographic subgroups. Again, the appropriate proportions to be applied to the subtotals are taken from NCHS data in the source cited in the table. Corrections (of equation 4) were made so that entries for the demographic subgroups sum to give the condition row totals. The demographic subgroup column totals, however, do not quite equal the sum of entries in the corresponding columns. No adjustments were applied to correct for these discrepancies. The calculations that give the data in this table are nearly the same as those outlined in Section II, C. for Tables 4 and 5 and need not be detailed again here.

IV. Average Length of Stay and Bed-Days of Hospital Care

Calculations for Tables 10 and 11:

Table 10 gives the (1973) average length of stay (ALOS) in a short-term hospital for each age-race-sex group excluding newborn infants and federal hospitals. The figures presented were taken directly from the source cited. Table 11 gives ALOS by condition and by age, race, and sex. However, the data in Table 11 is based on 1968 data. The overall ALOS in 1968 was 8.5 days

compared with 7.8 days in 1973. Hence, the 1968 data were multiplied by 0.92 (= 7.8/8.5) to give estimates for 1973. These estimates are presented in Table 11.

The ALOS is always lower for whites than for non-whites and ALOS increases with age for all groups, except non-white females. For white females, the ALOS is lower than for white males except in the 65+ age group; for non-whites, however, females have a lower ALOS in 15-44 and 45-64 age groups than males in the same age groups.

Table 12 is derived by multiplying the age-race-sex specific figures for ALOS from Table 10 by corresponding number of discharges from Table 8. The row and column subtotals and the overall total are found by addition of cells.

Table 13 is similarly derived from Tables 9 and 11 except that column totals are taken from Table 12. Adjustments are made, as for Table 9, such that the overall total sums correctly from the row totals and the row totals sum correctly from the individual cells. Again, the column totals (excepting overall total) do not quite sum correctly.

Figures for bed-days in hospital (BDH) (see Tables 12 and 13) are dependent not only on ALOS but also on the number of discharges generated by the group. Thus, there are two levels of analysis. On a micro level, for example, a white female in the 45-64 age group has an ALOS of 8.9 while a white male in the same age group has an ALOS of 9.1. On a macro level, however, partly due to the excess number of females in the U.S. population of persons aged 45-64, the utilization of medical care resources (as measured by bed days) is about 106% of that of white males, aged 45-64 years.

VI. Projections of Medical Services Utilization to 1990 and 2000

Tables 18-29 give estimates of medical services utilization in the years 1990 and 2000. It has been assumed that rates of physician visits, hospital

discharges, and the average length of stay per hospital discharge (ALOS) will be about the same in 1990 and in 2000 as they have been in the early 1970's. Adjustments for changes in utilization can be made separately if necessary.

A. U.S. Standard Million for 1990 and 2000

Two separate Standard Millions, each representing the U.S. population, were calculated for each of the years 1990 and 2000 (Tables 14-17). One set of estimates is based on Series E projections by the U.S. Bureau of the Census, which assumes 2.1 births per fecund woman, giving a total U.S. population of 246.6 and 264.4 millions in 1990 and 2000, respectively. The other set is based on the Series C projections which assumes an average number of births of 2.8 per fecund woman, giving a total U.S. population of 266.2 and 300.4 millions in the U.S. by 1990 and 2000, respectively. In each case, the Standard Million was calculated by dividing the projected figure for each age-race-sex specific cell by the corresponding total projected population and multiplying by one million. Tables 15-26 give estimates of health services utilization in the years 1990 and 2000. It has been assumed that rates of physician visits, hospital discharges and the average length of stay per hospital discharge (ALOS) will be about the same in 1990 and 2000 as they have been in the early 1970's.

A further assumption made in calculating each Standard Million for 1990 and 2000 was that the racial composition of the U.S. will remain essentially unchanged. This assumption was necessary as no population projections by race could be located; projections are typically broken down only by age and sex. In calculating these figures, the same ratios of whites to non-whites were used as were found in the 1974 Standard Million (Table 1) in the age-race-sex specific cells. Thus, while the age-sex specific projections are from Bureau of the Census data, the projections involving race specificity are based on a replication, in 1990 and 2000, of the racial mix of the 1974 population.

B. Physician Visits Per Person Per Year

Calculations for Tables 18-21:

The projected number of physician visits generated yearly by the U.S. Standard Million in 1990 and 2000, was calculated by multiplying the average number of visits (physician visits per person per year, Table 2) by the corresponding number of persons from the Standard Million for each series of projections.

Following Series E, the percent change in the number of physician visits for a Standard Million from 1974 to 1990 is -0.05%, while from 1974 to 2000 it is +3.24%; for Series C, the change is -0.88% for 1990, and +2.24% for 2000. These changes are for a Standard Million, however, and when the increase in population from 1974 (211.2 million) to 1990 (Series E 246.6 million, Series C 266.2 million) and 2000 (Series E 264.4 million, Series C 300.4 million) is taken into account, we see an increase from about 1.05 billion visits in 1974 to 1.22 billion (Series E) or 1.31 billion (Series C) by 1990, and to 1.35 billion (Series E) or 1.52 billion (Series C) by 2000.

C. Number of Hospital Discharges

Calculations for Tables 22-25:

The number of discharges generated by each Standard Million in 1990 and 2000 was derived from the discharge rate (discharges per 1000 population) for 1973 given in Table 7. This rate was multiplied by the number of persons in the corresponding cell for the Standard Million and divided by 1000 to give the projected number of discharges for each situation.

The overall percent change for the Series E projections is +1.21% for 1990 and +2.38% for 2000; for the Series C projections is -1.94% for 1990 and -2.18% for 2000. For the total population, then, the total number of hospital discharges for a population of 211.2 million in 1974 is in the neighborhood of 32.3 million. In 1990, we might expect 38.2 million discharges for a

population of 246.6 millions (Series E) and 40.0 million for a population of 266.2 million (Series C); for a population of 264.4 million in 2000 (Series E), there would be about 41.4 million discharges and the Series C projection of 300.4 million persons gives 45.0 million discharges.

D. Bed-Days of Hospital Care

Calculations for Tables 26-29:

If we assume that the average length of stay (ALOS) of a hospital patient remains essentially the same from 1973 (Table 9) to 1990 and 2000, we can estimate the number of bed-days of hospital care (BDH) required by a Standard Million in 1990 and in 2000 by multiplying the ALOS by the number of discharges generated.

In 1974, there were an estimated 253.0 million bed-days of hospital care delivered. In 1990, an estimated 287.2 million bed-days will be delivered to a Series E population, while 324.0 million bed-days will be delivered to a Series C population; in 2000, Series E gives 328.7 million bed-days and Series C gives 350.8 million bed days.

VII. Discussion

The Standard Million method allows national or regional estimates for the total demand for medical care services to be derived by multiplying the table entries by the number of millions of persons residing in the geographic area in question.

The top twenty specific diagnoses were tabulated, and it was found these accounted for over half (53.8%) of the physician visits generated by the Standard Million. About 17% of all physician visits relate to prenatal care and medical and surgical aftercare. A further 15% of physician visits concern diseases of the respiratory system. Hence nearly one third of all diagnoses

relate to a small number of problems. An analysis of principal complaints confirms this conclusion. Over one quarter (28.2%) of these were classified as "nonsymptomatic." A further one in eight (12.6%) may be classified as musculoskeletal and one in ten (10.2%) as respiratory. There is a strong possibility that a substantial proportion of these common problems could be handled by non-physician primary care practitioners.

The Standard Million's demand for inpatient care can similarly be used as a guide to estimating facility requirements and manpower needs in various specialties. On the average, every seven persons generate one discharge per year from a short-stay hospital, and each discharged patient stays in hospital nearly eight days. Hence the average person generates approximately 1.2 bed-days per year in short-stay hospitals. Nearly one in ten bed-days (9.5%) relate to neoplasms and just under one in seven (15.4%) are associated with diseases of the circulatory system. Over 11% are concerned with injuries and other adverse external effects.

The projections of demand for the years 1990 and 2000, with allowances for a likely range in interim birth rates, are based on the assumption that current utilization rates will prevail through the end of the century. It is likewise assumed that factors increasing service demand (such as new ways of treatment and better access and financing) will be roughly balanced by factors decreasing demand (such as utilization review and more effective and efficient treatment procedures). While there is no compelling logic in assuming such a balance, neither is there any convincing basis for projecting any net increase or decrease in service use. Under these assumptions and assuming a birth rate of 2.1 births per childbearing woman (Series E projections), it appears that in the year 1990 national medical care demand will probably approximate 1.22 billion physician visits and 287 million bed-days per year. The comparable projections for the year 2000 are 1.35 billion physician visits and 329 million bed-days. The

current supply of physicians will create excess capacity for physician visits at current per capita demand rates and the existing supply of hospital beds would seem sufficient to cope with increased demand due to population growth until well into the 1980's. These matters are considered in more detail in some of the other papers.

Table 1: U.S. Standard Million, Including Armed Forces Overseas July 1, 1974, by Age, Race, and Sex

Source: Calculations based on Current Population Reports, Population Estimates and Projections, Series P-25, No. 529, September 1974, Table 1.

	White		Non-white			
Male Age	Number	%	Number	%	Total	%
< 5	32,816	3.3	6,484	.6	39,300	3.9
5-14	77,774	7.8	14,379	1.4	92,153	9.2
15-24	81,143	8.1	13,175	1.3	94,318	9.4
25-34	61,583	6.2	8,112	.8	69,695	7.0
35-44	46,581	4.7	6,073	.6	52,654	5.3
45-54	48,675	4.9	5,616	.6	54,291	5.4
55-64	39,399	3.9	4,068	.4	43,467	4.3
65-74	25,105	2.5	2,666	.3	27,771	2.8
75 +	13,256	1.3	1,288	.1	14,544	1.5
Total	426,332	42.6	61,861	6.2	488,193	48.8
Female						
< 5	31,249	3.1	6,389	.6	37,638	3.8
5-14	74,376	7.4	14,266	1.4	88,642	8.9
15-24	78,755	7.9	13,600	1.4	92,355	9.2
25-34	61,389	6.1	9,400	.9	70,789	7.1
35-44	47,761	4.8	7,286	.7	55,047	5.5
45-54	51,654	5.2	6,460	.7	58,114	5.8
55-64	43,868	4.4	4,719	.5	48,587	4.9
65-74	32,821	3.3	3,294	.3	36,115	3.6
75 +	22,651	2.3	1,869	.2	24,520	2.5
Total	444,524	44.5	67,283	6.7	511,810	51.2
				TOTAL	1,000,000	100.0%

Table 2 : Number of Phvsician Visits Per Per Per Year by Age, Race, and Sex, for the U.S., 1971

Source: Vital and Health Statistics, Series 10, No. 97, Physician Visits, Table 7.

	White	Non-White
Male		
< 5	7.5	5.6
5-14	3.8	2.3
15-24	3.5	2.8
25-34	3.4	3.5
35-44	3.6	3.6
45-54	4.1	4.2
55-64	5.5	4.7
65-74	6.0	6.5
75 +	6.5	7.2
Total	4.4	3.6
Female		
< 5	6.9	4.0
5-14	3.2	2.5
15-24	5.6	4.5
25-34	6.8	6.4
35-44	5.3	5.9
45-54	5.9	6.7
55-64	6.0	8.2
65-74	6.7	7.4
75 +	7.6	7.4
Total	5.6	5.0
Overall Total	5.0	4.4

Table 3: Estimated Number of Physician Visits and Percent of Overall Total Per Year for 1974 U.S. Standard Million by Age, Race, and Sex

Source: Calculations from Table 1 and Table 2.

	White		Non-White			
Male Age	Number	%	Number	%	Total	%
< 5	246,120	5.0	36,310	.7	282,430	5.7
5-14	295,541	6.0	33,072	.7	328,613	6.6
15-24	284,001	5.7	36,890	.7	320,891	6.5
25-34	209,382	4.2	28,392	.6	237,774	4.8
35-44	167,692	3.4	21,863	.4	189,555	3.8
45-54	199,568	4.0	23,587	.5	223,155	4.5
55-64	216,695	4.4	19,120	.4	235,815	4.8
65-74	150,630	3.0	17,329	.3	167,959	3.4
75 +	86,164	1.7	9,274	.2	95,438	1.9
Total	1,855,793	37.5	225,837	4.6	2,081,630	42.0
Female						
< 5	215,618	4.4	25,556	.5	241,174	4.9
5-14	238,003	4.8	35,665	.7	273,668	5.5
15-24	441,028	8.9	61,200	1.2	502,228	10.1
25-34	417,445	8.4	60,160	1.2	477,605	9.6
35-44	253,133	5.1	42,987	.9	296,120	6.0
45-54	304,759	6.2	43,282	.9	348,041	7.0
55-64	263,208	5.3	38,696	.8	301,904	6.1
65-74	219,901	4.4	24,376	.5	244,277	4.9
75 +	172,148	3.5	13,831	.3	185,979	3.8
Total	2,525,243	51.0	345,753	7.0	2,870,996	58.0

Overall Total - 4,952,626

	Diagnosis	Totel	Male	Female	White	Other	<15	15-24	25-44	45-64	65+	Grouped
	All Diegnoses	4952626 (100.0%)	2081630 (42.0%)	2870996 (58.0%)	4381036 (88.5%)	571590 (11.5%)	1125885 (22.7%)	823119 (16.6%)	1201054 (24.3%)	1108915 (22.4%)	693653 (14.0%)	
1	Infective & Peresitic Diseases	193783 (3.9%)	89918 (1.8%)	103865 (2.1%)	169970 (3.4%)	23813 (0.5%)	74877 (1.5%)	41561 (0.8%)	40343 (0.8%)	25847 (0.5%)	11155 (0.2%)	
2	Neoplasms	97633 (2.0%)	37934 (0.8%)	59699 (1.2%)	87618 (1.8%)	10015 (0.2%)	*	*	18512 (0.4%)	36332 (0.7%)	29395 (0.6%)	13394 (0.3%)
3	Endocrine, nutritional & metebolic diseases	200434 (4.0%)	58283 (1.2%)	142151 (2.9%)	172599 (3.5%)	27835 (0.6%)	8681 (0.2%)	21360 (0.4%)	63053 (1.3%)	71381 (1.4%)	35959 (0.7%)	
4	Diebetes mellitus	68381 (1.4%)	30829 (0.6%)	37552 (0.8%)	55839 (1.1%)	12542 (0.3%)	*	*	8617 (0.2%)	27289 (0.6%)	29438 (0.6%)	3037 (0.1%)
5	Obesity	77842 (1.6%)	10566 (0.2%)	67276 (1.4%)	68027 (1.4%)	9815 (0.2%)	*	14638 (0.3%)	36503 (0.7%)	22742 (0.5%)	*	3959 (0.1%)
6	Mental Disorders	223205 (4.5%)	85804 (1.7%)	137401 (2.8%)	202701 (4.1%)	20504 (0.4%)	14043 (0.3%)	30682 (0.6%)	101297 (2.0%)	61231 (1.2%)	15952 (0.3%)	
7	Neuroses	127254 (2.6%)	38607 (0.8%)	88647 (1.8%)	114746 (2.3%)	12508 (0.3%)	4192 (0.1%)	16218 (0.3%)	59147 (1.2%)	38525 (0.8%)	9172 (0.2%)	
8	Personality Disordere	19100 (0.4%)	8940 (0.2%)	10160 (0.2%)	18085 (0.4%)	1015 (0.0%)	277 (0.0%)	*	12767 (0.3%)	*	*	6056 (0.1%)
9	Diseases of Nervoue System & Sense Organs	390447 (7.9%)	183934 (3.7%)	206513 (4.2%)	360451 (7.3%)	29996 (0.6%)	125973 (2.5%)	40564 (0.8%)	60492 (1.2%)	91989 (1.9%)	71429 (1.4%)	
10	Diseases & Cond. of the Eye	117101 (2.4%)	49936 (1.0%)	67165 (1.4%)	105089 (2.1%)	12012 (0.2%)	25107 (0.5%)	9877 (0.2%)	10996 (0.2%)	31946 (0.6%)	39175 (0.8%)	
11	Diseases of Eer & Mastoid Process	60977 (1.2%)	32880 (0.7%)	28097 (0.6%)	57606 (1.2%)	3371 (0.1%)	13074 (0.3%)	6788 (0.1%)	14893 (0.3%)	15747 (0.3%)	10475 (0.2%)	
12	Refractive Errore	70461 (1.4%)	26578 (0.5%)	43883 (0.9%)	64821 (1.3%)	5640 (0.1%)	15586 (0.3%)	14432 (0.3%)	12370 (0.2%)	20696 (0.4%)	7377 (0.1%)	
13	Otitis Medie	81375 (1.6%)	49021 (1.0%)	32354 (0.7%)	76613 (1.5%)	4762 (0.1%)	61866 (1.2%)	*	*	*	*	19509 (0.4%)
14	Diseases of Circulatory System	454949 (9.2%)	204188 (4.1%)	250761 (5.1%)	398557 (8.0%)	56392 (1.1%)	4686 (0.1%)	9661 (0.2%)	53709 (1.1%)	186028 (3.8%)	200865 (4.1%)	
15	Essentiel Benign Hypertension	174730 (3.5%)	66989 (1.4%)	107741 (2.2%)	150465 (3.0%)	24265 (0.5%)	1350 (0.0%)	3297 (0.1%)	21748 (0.4%)	81733 (1.7%)	66602 (1.3%)	
16	Ischemic Heert Diseese	16750 (0.3%)	11247 (0.2%)	5503 (0.1%)	15661 (0.3%)	1089 (0.0%)	*	*	*	7702 (0.2%)	7906 (0.2%)	1142 (0.0%)
17	Chronic Ischemic Heert Diseese	118936 (2.4%)	61763 (1.2%)	57173 (1.2%)	100776 (2.0%)	18160 (0.4%)	*	*	*	47244 (1.0%)	64835 (1.3%)	6857 (0.1%)
18	Diseases of Respiretory System	747878 (15.1%)	363624 (7.3%)	384254 (7.8%)	656772 (13.3%)	91106 (1.8%)	310969 6.3%)	108099 (2.2%)	142598 (2.9%)	128028 (2.6%)	58184 (1.2%)	
19	Acute Respiretory Infection (except influenza)	390585 (7.9%)	188726 (3.8%)	201859 (4.1%)	343421 (6.9%)	47164 (1.0%)	193427 (3.9%)	61575 (1.2%)	66431 (1.3%)	50976 (1.0%)	18176 (0.4%)	
20	Influenze	39927 (0.8%)	19413 (0.4%)	20514 (0.4%)	29961 (0.6%)	9966 (0.2%)	14352 (0.3%)	8172 (0.2%)	*	*	*	17403 (0.4%)
21	Hay Fever	93432 (1.9%)	46648 (0.9%)	46784 (0.9%)	86355 (1.7%)	7077 (0.1%)	31596 (0.6%)	15303 (0.3%)	25804 (0.5%)	16730 (0.3%)	3999 (0.1%)	

TABLE 4 (cont.)

Diagnosis	Total	Male	Female	White	Other	<15	15-24	25-44	45-64	65+	Grouped
22 Disease of Digestive System	182978 (3.7%)	90253 (1.8%)	92725 (1.9%)	160688 (3.2%)	22290 (0.5%)	17249 (0.3%)	20319 (0.4%)	49295 (1.0%)	59684 (1.2%)	36431 (0.7%)	
23 Diseases of Genitourinary System	289865 (5.9%)	57196 (1.2%)	232669 (4.7%)	254245 (5.1%)	35620 (0.7%)	12275 (0.2%)	57518 (1.2%)	109333 (2.2%)	77109 (1.6%)	33630 (0.7%)	
24 Diseases of Male Organs	27616 (0.6%)	27616 (0.6%)	0 (0.0%)	25228 (0.5%)	2388 (0.0%)			8575 (0.2%)	8384 (0.2%)		10657 (0.2%)
25 Diseases of Female Organs	168148 (3.4%)	0 (0.0%)	168148 (3.4%)	144081 (2.9%)	24067 (0.5%)	*	39152 (0.8%)	72917 (1.5%)	45240 (0.9%)	*	10839 (0.2%)
26 Diseases of Skin & Subcutaneous Tissue	261872 (5.3%)	120717 (2.4%)	141155 (2.9%)	232769 (4.7%)	29103 (0.6%)	69994 (1.4%)	74820 (1.5%)	54603 (1.1%)	38820 (0.8%)	23635 (0.5%)	
27 Disease of Musculoskeletal System	263953 (5.3%)	104182 (2.1%)	159771 (3.2%)	233208 (4.7%)	30745 (0.6%)	19386 (0.4%)	24385 (0.5%)	52038 (1.1%)	99583 (2.0%)	68561 (1.4%)	
28 Arthritis & Rheumatism	141791 (2.9%)	48640 (1.0%)	93151 (1.9%)	120894 (2.4%)	20897 (0.4%)	*	*	19438 (0.4%)	57790 (1.2%)	50228 (1.0%)	14335 (0.3%)
29 Symptoms & Ill-defined Conditions	263039 (5.3%)	104092 (2.1%)	158947 (3.2%)	235776 (4.8%)	27263 (0.6%)	61757 (1.2%)	48460 (1.0%)	81293 (1.6%)	49014 (1.0%)	22515 (0.5%)	
30 Accidents, Poisoning, & Violence	365626 (7.4%)	219896 (4.4%)	145730 (2.9%)	316797 (6.4%)	48829 (1.0%)	83252 (1.7%)	82894 (1.7%)	95241 (1.9%)	73609 (1.5%)	30630 (0.6%)	
31 Fracture	61315 (1.2%)	35067 (0.7%)	26248 (0.5%)	56078 (1.1%)	5237 (0.1%)	16552 (0.3%)	11570 (0.2%)	11418 (0.2%)	13127 (0.3%)	8648 (0.2%)	
32 Dislocation, Sprain	118330 (2.4%)	68375 (1.4%)	49955 (1.0%)	100010 (2.0%)	18319 (0.4%)	6917 (0.1%)	30781 (0.6%)	44711 (0.9%)	28233 (0.6%)	7688 (0.2%)	
33 Lacerations	70124 (1.4%)	47692 (1.0%)	22432 (0.5%)	58524 (1.2%)	11600 (0.2%)	26899 (0.5%)	17983 (0.4%)	12449 (0.3%)	8894 (0.2%)	3899 (0.1%)	
34 Non-illness Conditions & Exams	846333 (17.1%)	291207 (5.9%)	555126 (11.2%)	745041 (15.0%)	101292 (2.0%)	241217 (4.9%)	211324 (4.3%)	238714 (4.8%)	98311 (2.0%)	56767 (1.1%)	
35 Medical & Special Exams	304218 (6.1%)	137155 (2.8%)	167063 (3.4%)	269433 (5.4%)	34785 (0.7%)	161006 (3.3%)	52101 (1.1%)	59524 (1.2%)	23725 (0.5%)	7862 (0.2%)	
36 Prenatal Care	194751 (3.9%)	0 (0.0%)	194751 (3.9%)	161504 (3.3%)	33247 (0.7%)		98658 (2.0%)	93656 (1.9%)	*	*	2437 (0.0%)
37 Medical & Surgical Aftercare	248402 (5.0%)	119024 (2.4%)	129378 (2.6%)	227984 (4.6%)	20418 (0.4%)	46484 (0.9%)	36893 (0.7%)	59723 (1.2%)	64192 (1.3%)	41110 (0.8%)	
38 Other Diagnoses	66276 (1.3%)	24315 (0.5%)	41961 (0.8%)	60330 (1.2%)	5946 (0.1%)	19530 (0.4%)	10497 (0.2%)	14421 (0.3%)	11446 (0.2%)	10382 (0.2%)	
39 No Diagnoses Given	61584 (1.2%)	24244 (0.5%)	37340 (0.8%)	56588 (1.1%)	4996 (0.1%)	19821 (0.4%)	15739 (0.3%)	13739 (0.3%)	8070 (0.2%)	4215 (0.1%)	
40 Diagnosis Unknown	42769 (0.9%)	16133 (0.3%)	26636 (0.5%)	37057 (0.7%)	5712 (0.1%)	11617 (0.2%)	*	10431 (0.2%)	9059 (0.2%)	*	11662 (0.2%)

Calculations based on National Ambulatory Care Survey, Table 19, "Number and Percent Distribution of Office Visits by Patient Sex, Color, and Age, according to Principal Diagnosis: U. S. May 1973 - April 1974," and Table 3 of this paper.

	Complaint	Total	Male	Female	White	Other	<15	15-24	25-44	45-64	65+	Grouped
	All Problems	4952526 (100.0%)	2081630 (42.0%)	2870996 (58.0%)	4381036 (88.5%)	571590 (11.5%)	1125885 (22.7%)	823119 (16.6%)	1201054 (24.3%)	1108915 (22.4%)	693653 (14.0%)	
1	General symptoms	291217 (5.9%)	103224 (2.1%)	187993 (3.8%)	255120 (5.2%)	36097 (0.7%)	86085 (1.7%)	35400 (0.7%)	68648 (1.4%)	64684 (1.3%)	36400 (0.7%)	
2	Fever/chills	78610 (1.6%)	39563 (0.8%)	39047 (0.8%)	66190 (1.3%)	12420 (0.3%)	63152 (1.3%)	*	*	*	*	15458 (0.3%)
3	Fatigue	90375 (1.8%)	31190 (0.6%)	59185 (1.2%)	83335 (1.7%)	7040 (0.1%)	2711 (0.1%)	9108 (0.2%)	21940 (0.4%)	30184 (0.6%)	26432 (0.5%)	
4	Weight loss/gain	73541 (1.5%)	10462 (0.2%)	63079 (1.3%)	64033 (1.3%)	9508 (0.2%)	*	13715 (0.3%)	35070 (0.7%)	20151 (0.4%)	*	4605 (0.1%)
5	All other	48690 (1.0%)					*	*	*	*	*	48690 (1.0%)
6	Nervous system	179576 (3.6%)	67181 (1.4%)	112395 (2.3%)	149870 (3.0%)	29706 (0.6%)	16327 (0.3%)	17587 (0.4%)	47081 (1.0%)	54405 (1.1%)	44176 (0.9%)	
7	Headache	94569 (1.9%)	29681 (0.6%)	64888 (1.3%)	77424 (1.6%)	17145 (0.3%)	10959 (0.2%)	13388 (0.3%)	29022 (0.6%)	27539 (0.6%)	13661 (0.3%)	
8	Vertigo-dizziness	58412 (1.2%)	23774 (0.5%)	34638 (0.7%)	49307 (1.0%)	9105 (0.2%)	*	*	10689 (0.2%)	20144 (0.4%)	23654 (0.5%)	3925 (0.1%)
9	All other	26587 (0.5%)					*	*	*	*	*	26587 (0.5%)
10	Skin, nails, & hair	316091 (6.4%)	151139 (3.1%)	164952 (3.3%)	281300 (5.7%)	34791 (0.7%)	84449 (1.7%)	85013 (1.7%)	63745 (1.3%)	51465 (1.0%)	31419 (0.6%)	
11	Cardiovascular-lymphatic	97564 (2.0%)	38208 (0.8%)	59356 (1.2%)	86408 (1.7%)	11156 (0.2%)	*	*	15938 (0.3%)	33379 (0.7%)	33355 (0.7%)	14892 (0.3%)
12	High blood pressure	53866 (1.1%)	20541 (0.4%)	33325 (0.7%)	46845 (0.9%)	7021 (0.1%)	*	*	*	22521 (0.5%)	21949 (0.4%)	9396 (0.2%)
13	All other	43698 (0.9%)					*	*	*	*	*	43698 (0.9%)
14	Respiratory	505513 (10.2%)	248326 (5.0%)	257187 (5.2%)	445551 (9.0%)	59962 (1.2%)	160751 (3.2%)	56109 (1.1%)	98164 (2.0%)	120473 (2.4%)	70016 (1.4%)	
15	Cough	140901 (2.8%)	70065 (1.4%)	70836 (1.4%)	127504 (2.6%)	13397 (0.3%)	65126 (1.3%)	11789 (0.2%)	24760 (0.5%)	27406 (0.6%)	11820 (0.2%)	
16	Cold, flu, croup	116763 (2.4%)	53352 (1.1%)	63411 (1.3%)	93992 (1.9%)	22771 (0.5%)	48660 (1.0%)	19949 (0.4%)	22084 (0.4%)	18524 (0.4%)	7546 (0.2%)	
17	Pain in chest	87165 (1.8%)	46394 (0.9%)	40771 (0.8%)	78224 (1.6%)	8941 (0.2%)	*	*	22165 (0.4%)	34028 (0.7%)	21319 (0.4%)	9653 (0.2%)
18	All other	160684 (3.2%)					*	*	*	*	*	160684 (3.2%)
19	Musculoskeletal	623351 (12.6%)	303705 (6.1%)	319646 (6.5%)	555407 (11.2%)	67944 (1.4%)	77073 (1.6%)	93464 (1.9%)	151162 (3.1%)	191516 (3.9%)	110136 (2.2%)	
20	Pain etc. - lower extremity	199244 (4.0%)	93861 (1.9%)	105383 (2.1%)	181155 (3.7%)	18089 (0.4%)	26272 (0.5%)	32904 (0.7%)	37770 (0.8%)	66057 (1.3%)	36241 (0.7%)	
21	Pain etc. - upper extremity	145578 (2.9%)	80522 (1.6%)	65056 (1.3%)	130957 (2.6%)	14621 (0.3%)	23975 (0.5%)	27856 (0.6%)	31714 (0.6%)	42574 (0.9%)	19459 (0.4%)	
22	Pain etc. - back region	144564 (2.9%)	69851 (1.4%)	74713 (1.5%)	126336 (2.6%)	18228 (0.4%)	2143 (0.0%)	18326 (0.4%)	54037 (1.1%)	46219 (0.9%)	23839 (0.5%)	
23	All other	133973 (2.7%)					*	*	*	*	*	133973 (2.7%)

TABLE 5 (cont.)

Complaint	Total	Male	Female	White	Other	<15	15-24	25-44	45-64	65+	Groupad
24 Digestive	453751 (9.2%)	202268 (4.1%)	251483 (5.1%)	399929 (8.1%)	53882 (1.1%)	130470 (2.6%)	83055 (1.7%)	104385 (2.1%)	87203 (1.8%)	48638 (1.0%)	
25 Throat soreness	159171 (3.2%)	75786 (1.5%)	83385 (1.7%)	144720 (2.9%)	14451 (0.3%)	66943 (1.3%)	39830 (0.8%)	33008 (0.7%)	15720 (0.3%)	5670 (0.1%)	
26 Abdominal pain	126086 (2.5%)	43646 (0.9%)	82440 (1.7%)	106700 (2.2%)	19386 (0.4%)	17312 (0.3%)	23310 (0.5%)	35260 (0.7%)	30225 (0.6%)	19979 (0.4%)	
27 All other	168486 (3.4%)					*	*	*	*	*	168486 (3.4%)
28 Urinary	84639 (1.7%)	33581 (0.7%)	51058 (1.0%)	75685 (1.5%)	8954 (0.2%)	8483 (0.2%)	9858 (0.2%)	22765 (0.5%)	23930 (0.5%)	19603 (0.4%)	
29 Male reproductive	14937 (0.3%)	14937 (0.3%)	0 (0.0%)	13197 (0.3%)	1740 (0.0%)	1160 (0.0%)	3369 (0.1%)	5520 (0.1%)	3135 (0.1%)	1753 (0.0%)	
30 Female reproductive	159985 (3.2%)	0 (0.0%)	159985 (3.2%)	134029 (2.7%)	25956 (0.5%)	*	47316 (1.0%)	67893 (1.4%)	35076 (0.7%)	*	9700 (0.2%)
31 Eyes and Ears	272486 (5.5%)	135224 (2.7%)	137262 (2.8%)	249502 (5.0%)	22984 (0.5%)	94494 (1.9%)	34632 (0.7%)	43846 (0.9%)	57470 (1.2%)	42044 (0.8%)	
32 Earache	57337 (1.2%)	31714 (0.6%)	25623 (0.5%)	55469 (1.1%)	1868 (0.0%)	35717 (0.7%)	*	7365 (0.1%)	*	*	14255 (0.3%)
33 All other	215156 (4.3%)					*	*	*	*	*	215156 (4.3%)
34 Mental Health	148373 (3.0%)	59933 (1.2%)	88440 (1.8%)	136336 (2.8%)	12037 (0.2%)	6872 (0.1%)	17728 (0.4%)	67527 (1.4%)	43900 (0.9%)	12346 (0.2%)	
35 Nonsymptomatic	1396641 (28.2%)	531137 (10.7%)	865504 (17.5%)	1247399 (25.2%)	149242 (3.0%)	360290 (7.3%)	275338 (5.6%)	356880 (7.2%)	238050 (4.8%)	166083 (3.4%)	
36 General medical exam	115365 (2.3%)	56091 (1.1%)	59274 (1.2%)	102297 (2.1%)	13068 (0.3%)	58283 (1.2%)	11199 (0.2%)	18338 (0.4%)	18662 (0.4%)	8883 (0.2%)	
37 Physical exam	85207 (1.7%)	56471 (1.1%)	28736 (0.6%)	73465 (1.5%)	11742 (0.2%)	23987 (0.5%)	33444 (0.7%)	18650 (0.4%)	7817 (0.2%)	1309 (0.0%)	
38 Gynacological exam	101020 (2.0%)	0 (0.0%)	101020 (2.0%)	91090 (1.8%)	9930 (0.2%)	*	28395 (0.6%)	54157 (1.1%)	15894 (0.3%)	*	2574 (0.1%)
39 Pregnancy exam	199228 (4.0%)	0 (0.0%)	199228 (4.0%)	168596 (3.4%)	30632 (0.6%)	*	98726 (2.0%)	97047 (2.0%)	*	*	3455 (0.1%)
40 Well baby exam	82166 (1.7%)	44306 (0.9%)	37860 (0.8%)	74266 (1.5%)	7900 (0.2%)	82166 (1.7%)					
41 Visit for medication	100628 (2.0%)	44321 (0.9%)	57307 (1.2%)	93114 (1.9%)	7514 (0.2%)	43414 (0.9%)	10363 (0.2%)	18284 (0.4%)	19014 (0.4%)	9553 (0.2%)	
42 Progress visits	581151 (11.7%)	275532 (5.6%)	305619 (6.2%)	522161 (10.5%)	58990 (1.2%)	113076 (2.3%)	63953 (1.3%)	115199 (2.3%)	156663 (3.2%)	132260 (2.7%)	
43 All other	131877 (2.7%)					*	*	*	*	*	131877 (2.7%)
44 All other	408517 (8.2%)	185597 (3.7%)	222920 (4.5%)	350916 (7.1%)	57601 (1.2%)	80188 (1.6%)	53311 (1.1%)	87625 (1.8%)	108249 (2.2%)	79144 (1.6%)	

Calculations based on National Ambulatory Care Survey, Table 14, "Number and Percent Distribution of Office Visits by Patient Sex, Color, and Age, according to Patient's Principal Problem, Complaint, or Symptom: U. S. May 1973 - April 1974," and Table 3 of this paper.

TABLE 6 Number of Physician Visits for Twenty Most Frequent Diagnoses for 1974 U.S. Standard Million

Diagnoses	No. Physician Visits	%
All Visits	4952626	
Medical & special exams (Y00)	304218	6.1
Medical & surgical aftercare (Y10)	248402	5.0
Prenatal Care (Y06)	194751	3.9
Essential benign hypertension (401)	174730	3.5
Acute Respiratory Infection (465)	165222	3.3
Neuroses (300)	127254	2.6
Observations (193)	122054	2.5
Chronic Ischemic Heart Disease (412)	118936	2.4
Hay fever (507)	93432	1.9
Otitis media (381)	80814	1.6
Acute pharyngitis (462)	79985	1.6
Obesity (277)	77842	1.6
Refractive errors (370)	70462	1.4
Other eczema (692)	70285	1.4
Diabetes (250)	68381	1.4
Acute tonsillitis (463)	63235	1.3
None	61584	1.2
Diseases of Sebaceous glands (706)	61192	1.2
Other viral diseases (079)	53428	1.1
Bronchitis, unqualified (490)	53083	1.1
All Other	2663334	53.8

Source: Calculations based on National Ambulatory Care Suvey and Table 3.

Table 7 : Hospital Discharges per 1000 Population during 1973, by Age, Race, and Sex

Source: Calculations based on Current Population Reports, Population Estimates and Projections, Series P-25, No. 529, September 1974, and Monthly Vital Statistics Report, Hospital Discharge Survey Data, Utilization of Short-Stay Hospitals--Summary of Nonmedical Statistics: U.S., 1973, (HRA) 76-1120, Vol. 24, No. 5, Supplement (2), August 19, 1975

Sex / Age	White	Non-white	Total
Male			
< 15	78.5	78.9	78.6
15-44	84.6	105.0	87.2
45-64	177.8	166.9	176.7
65 +	357.4	293.9	351.5
All male	126.8	118.0	125.7
Female			
< 15	63.1	57.9	62.3
15-44	202.2	272.7	212.0
45-64	177.8	179.6	178.0
65 +	310.5	260.9	306.3
All female	177.4	190.4	179.1
Male & Female			
< 15	71.0	68.5	70.6
15-44	143.2	193.1	149.8
45-64	177.8	173.7	177.4
65 +	329.7	275.2	324.9
All	152.7	155.7	153.0

Table 8: Number of Discharges Generated by 1974 U.S. Standard Million by Age, Race, and Sex

Source: Calculations based on Current Population Reports, Population Estimates and Projections, Series P-25, No. 529, September 1974, and Monthly Vital Statistics Report, Hospital Discharge Survey Data, Utilization of Short-Stay Hospitals -- Summary of Nonmedical Statistics: U.S., 1973, (HRA) 76-1120, Vol. 24, No. 5, Supplement (2), August 19, 1975

Sex / Age	White		Nonwhite		Total	
	number persons	number discharges	number persons	number discharges	number persons	number discharges
Male						
< 15	110590	8681	20863	1646	131453	10327
15-44	189307	16015	27360	2873	216667	18888
45-64	88074	15660	9684	1616	97758	17276
65 +	38361	13710	3954	1162	42315	14872
All Male	426332	54066	61861	7297	488193	61363
Female						
< 15	105625	6665	20655	1196	126280	7861
15-44	187905	37994	30286	8259	218191	46253
45-64	95522	16984	11179	2008	106701	18992
65 +	55472	17224	5163	1347	60635	18571
All Female	444524	78867	67283	12810	511807	91677
Male + Female						
< 15	216215	15346	41518	2842	257733	18188
15-44	377212	54009	57646	11132	434858	65141
45-64	183596	32644	20863	3624	204459	36268
65 +	93833	30934	9117	2509	102950	33443
All	870856	132933	129144	20107	1000000	153040

Table 9: Number of discharges generated by 1974 U.S. Standard by Condition, Estimated with Percen of Overall Total, by Age, Race, and Sex

	Condition	Total	<15	15-44	45-64	65+	White	Nonwhite	Male	Female
1	Total, all conditions	153040 (100.0%)	18188 (11.9%)	65141 (42.6%)	36268 (23.7%)	33443 (21.9%)	132933 (86.9%)	20107 (13.1%)	61363 (40.1%)	91677 (59.9%)
2	Infective and parasitic diseases	1729 (1.1%)	437 (0.3%)	759 (0.5%)	306 (0.2%)	227 (0.1%)	1414 (0.9%)	315 (0.2%)	882 (0.6%)	847 (0.6%)
3	Neoplasms	10437 (6.8%)	300 (0.2%)	3371 (2.2%)	3712 (2.4%)	3054 (2.0%)	9190 (6.0%)	1247 (0.8%)	3602 (2.4%)	6835 (4.5%)
4	A. Malignant	5644 (3.7%)	75 r	853 (0.6%)	2306 (1.5%)	2410 (1.6%)	5068 (3.3%)	576 (0.4%)	2560 (1.7%)	3084 (2.0%)
5	1. Sex-specific	999 (0.7%)	-	251 (0.2%)	307 (0.2%)	441 (0.3%)	818 (0.5%)	181 (0.1%)	315 (0.2%)	684 (0.4%)
6	a. Male	315 (0.2%)	-	-	49 r	266 (0.2%)	267 (0.2%)	48 r	315 (0.2%)	-
7	b. Female	684 (0.4%)	-	251 (0.2%)	258 (0.2%)	175 (0.1%)	551 (0.4%)	133 (0.1%)	-	684 (0.4%)
8	2. Not sex-specific	4645 (3.0%)	75 r	602 (0.4%)	1999 (1.3%)	1969 (1.3%)	4250 (2.8%)	395 (0.3%)	2245 (1.5%)	2400 (1.6%)
9	B. Benign	4793 (3.1%)	227 (0.1%)	2558 (1.7%)	1550 (1.0%)	458 (0.3%)	4122 (2.7%)	671 (0.4%)	1042 (0.7%)	3751 (1.7%)
10	1. Sex-specific	2148 (1.4%)	9 r	1279 (0.8%)	787 (0.5%)	73 r	1802 (1.2%)	346 (0.2%)	-	2148 (1.4%)
11	a. Male	-	-	-	-	-	-	-	-	-
12	b. Female	2148 (1.4%)	9 r	1279 (0.8%)	787 (0.5%)	73 r	1802 (1.2%)	346 (0.2%)	-	2148 (1.4%)
13	2. Not sex-specific	2645 (1.7%)	218 (0.1%)	1279 (0.8%)	763 (0.5%)	385 (0.3%)	2320 (1.5%)	325 (0.2%)	1042 (0.7%)	1603 (1.0%)
14	Allergic, endocrine, metabolic, & nutritional conditions	4248 (2.8%)	312 (0.2%)	1175 (0.8%)	1451 (0.9%)	1310 (0.9%)	3539 (2.3%)	709 (0.5%)	1535 (1.0%)	2713 (1.8%)
15	A. Hay fever, asthma	726 (0.5%)	147 (0.1%)	203 (0.1%)	211 (0.1%)	165 (0.1%)	547 (0.4%)	179 (0.1%)	305 (0.2%)	421 (0.3%)
16	B. Diabetes mellitus	2086 (1.4%)	67 r	394 (0.3%)	737 (0.5%)	888 (0.6%)	1755 (1.1%)	331 (0.2%)	796 (0.5%)	1290 (0.8%)

Table 9 - Continued

	Condition	Total	<15	15-44	45-64	65+	White	Nonwhite	Male	Female
17	C. Other	1436 (0.9%)	98 (0.1%)	578 (0.4%)	503 (0.3%)	257 (0.2%)	1237 (0.8%)	199 (0.1%)	434 (0.3%)	1002 (0.7%)
18	Conditions of blood and blood-forming organs	953 (0.6%)	138 (0.1%)	210 (0.1%)	223 (0.1%)	382 (0.2%)	797 (0.5%)	156 (0.1%)	433 (0.3%)	520 (0.3%)
19	Mental, psychoneurotic, and personality disorders	4328 (2.8%)	131 (0.1%)	2309 (1.5%)	1335 (0.9%)	553 (0.4%)	3765 (2.5%)	563 (0.4%)	1932 (1.3%)	2396 (1.6%)
20	Conditions of the nervous system & sense organs	8352 (5.5%)	1054 (0.7%)	1372 (0.9%)	2075 (1.4%)	3851 (2.5%)	7495 (4.9%)	857 (0.6%)	3982 (2.6%)	4370 (2.9%)
21	A. Conditions of ear and mastoid process	1220 (0.8%)	441 (0.3%)	329 (0.2%)	303 (0.2%)	147 (0.1%)	1153 (0.8%)	67 r	596 (0.4%)	624 (0.4%)
22	B. Cataract and other conditions of eye	2352 (1.5%)	372 (0.2%)	265 (0.2%)	534 (0.3%)	1181 (0.8%)	2142 (1.4%)	210 (0.1%)	1111 (0.1%)	1241 (0.8%)
23	C. Other	4780 (3.1%)	241 (0.2%)	778 (0.5%)	1238 (0.8%)	2523 (1.6%)	4200 (2.7%)	580 (0.4%)	2275 (1.5%)	2505 (1.6%)
24	Conditions of the circulatory system	14448 (9.4%)	274 (0.2%)	2206 (1.4%)	5075 (3.3%)	6893 (4.5%)	12932 (8.5%)	1516 (1.0%)	7283 (4.8%)	7165 (4.7%)
25	A. Congestive heart failure	983 (0.6%)	5	23 r	194 (0.1%)	761 (0.5%)	837 (0.5%)	146 (0.1%)	466 (0.3%)	517 (0.3%)
26	B. Arteriosclerosis	385 (0.3%)	- -	12 r	85 (0.1%)	288 (0.2%)	352 (0.2%)	33 r	194 (0.1%)	191 (0.1%)
27	C. Other	13080 (8.5%)	269 (0.2%)	2171 (1.4%)	4796 (3.1%)	5844 (3.8%)	11743 (7.8%)	1337 (0.9%)	6623 (4.3%)	6457 (4.2%)
28	Conditions of the respiratory system	17737 (11.6%)	7492 (4.9%)	4028 (2.6%)	2930 (1.9%)	3287 (2.1%)	15821 (10.3%)	1916 (1.3%)	9172 (6.0%)	8565 (5.6%)
29	A. Upper respiratory infection, acute	2090 (1.4%)	1084 (0.7%)	497 (0.3%)	249 (0.2%)	260 (0.2%)	1857 (1.2%)	233 (0.2%)	1056 (0.7%)	1034 (0.7%)
30	B. Pneumonia	3828 (2.5%)	1358 (0.9%)	563 (0.4%)	752 (0.5%)	1155 (0.8%)	3241 (2.1%)	587 (0.4%)	2037 (1.3%)	1791 (1.2%)
31	C. Bronchitis, acute	999 (0.7%)	333 (0.2%)	182 (0.1%)	259 (0.2%)	225 (0.1%)	908 (0.6%)	91 (0.1%)	509 (0.3%)	490 (0.3%)
32	D. Other	10820 (7.1%)	4717 (3.1%)	2786 (1.8%)	1670 (1.1%)	1647 (1.1%)	9815 (6.4%)	1005 (0.7%)	5570 (3.6%)	5250 (3.4%)
33	Conditions of the digestive system	21544 (14.1%)	2434 (1.6%)	7329 (4.8%)	6814 (4.5%)	4967 (3.2%)	19456 (12.7%)	2088 (1.4%)	10686 (7.0%)	10858 (7.1%)

Table 9 - Continued

	Condition	Total	<15	15-44	45-64	65+	White	Nonwhite	Male	Female
34	A. Ulcers of stomach, duodenum, jejunum	2413 (1.6%)	26 r	819 (0.5%)	964 (0.6%)	604 (0.4%)	2158 (1.4%)	255 (0.2%)	1493 (1.0%)	920 (0.6%)
35	B. Appendicitis	1814 (1.2%)	560 (0.4%)	1001 (0.7%)	169 (0.1%)	84 (0.1%)	1632 (1.1%)	182 (0.1%)	1009 (0.7%)	805 (0.5%)
36	C. Inguinal hernia	2689 (1.8%)	552 (0.4%)	654 (0.4%)	952 (0.6%)	531 (0.3%)	2443 (1.6%)	246 (0.2%)	2402 (1.6%)	287 (0.2%)
37	D. Cholelithiasis and cholecystitis	2613 (1.7%)	5 r	799 (0.5%)	1020 (0.7%)	789 (0.5%)	2467 (1.6%)	146 (0.1%)	648 (0.4%)	1965 (1.3%)
38	E. Other	12015 (7.9%)	1291 (0.8%)	4056 (2.7%)	3709 (2.4%)	2959 (1.9%)	10756 (7.0%)	1259 (0.8%)	5134 (3.4%)	6881 (4.5%)
39	Conditions of genitourinary system	14642 (9.6%)	1086 (0.7%)	7064 (4.6%)	3928 (2.6%)	2564 (1.7%)	12734 (8.3%)	1908 (1.2%)	4906 (3.2%)	9736 (6.4%)
40	A. Cystitis	963 (0.6%)	107 (0.1%)	363 (0.2%)	253 (0.2%)	240 (0.2%)	871 (0.6%)	92 (0.1%)	225 (0.1%)	738 (0.5%)
41	B. Sex-specific	8176 (5.3%)	373 (0.2%)	4364 (2.9%)	2072 (1.4%)	1367 (0.9%)	6969 (4.6%)	1207 (0.8%)	2254 (1.5%)	5922 (3.9%)
42	1. Male	2254 (1.5%)	317 (0.2%)	368 (0.2%)	587 (0.4%)	982 (0.6%)	1931 (1.3%)	323 (0.2%)	2254 (1.5%)	- -
43	2. Female	5922 (3.9%)	56 r	3996 (2.6%)	1485 (1.0%)	385 (0.3%)	5038 (3.3%)	884 (0.6%)	- -	5922 (3.9%)
44	C. Other	5503 (3.6%)	606 (0.4%)	2337 (1.5%)	1603 (1.0%)	957 (0.6%)	4894 (3.2%)	609 (0.4%)	2427 (1.6%)	3076 (2.0%)
45	Deliveries and complications of pregnancy, childbirth, and puerperium	23175 (15.1%)	84 (0.1%)	23041 (15.1%)	50 r	- -	18335 (12.0%)	4840 (3.2%)	- -	23175 (15.1%)
46	A. Abortion	1756 (1.1%)	5 r	1739 (1.1%)	12 r	- -	1369 (0.9%)	387 (0.3%)	- -	1756 (1.1%)
47	B. Normal delivery	14938 (9.8%)	38 r	14869 (9.7%)	31 r	- -	12120 (7.9%)	2818 (1.8%)	- -	14938 (9.8%)
48	C. Delivery with complications	3606 (2.4%)	25 r	3574 (2.3%)	7 r	- -	2635 (1.7%)	971 (0.6%)	- -	3606 (2.4%)
49	D. Other	2875 (1.9%)	16 r	2859 (1.9%)	- -	- -	2211 (1.4%)	664 (0.4%)	- -	2875 (1.9%)

Table 9 - Continued

	Condition	Total	<15	15-44	45-64	65+	White	Nonwhite	Male	Female
50	Conditions of skin and cellular tissues	2145 (1.4%)	309 (0.2%)	886 (0.6%)	574 (0.4%)	376 (0.2%)	1818 (1.2%)	327 (0.2%)	1031 (0.7%)	1114 (0.7%)
51	Diseases of bones and organs of movement	5476 (3.6%)	359 (0.2%)	2036 (1.3%)	1971 (1.3%)	1110 (0.7%)	4979 (3.3%)	497 (0.3%)	2527 (1.7%)	2949 (1.9%)
52	A. Osteoarthritis	697 (0.5%)	- -	76 r	284 (0.2%)	337 (0.2%)	651 (0.4%)	46 r	286 (0.2%)	411 (0.3%)
53	B. Other	4779 (3.1%)	359 (0.2%)	1960 (1.3%)	1687 (1.1%)	773 (0.5%)	4328 (2.8%)	451 (0.3%)	2241 (1.5%)	2538 (1.7%)
54	Congenital malformations	1259 (0.8%)	682 (0.4%)	363 (0.2%)	154 (0.1%)	60 r	1136 (0.7%)	123 (0.1%)	694 (0.5%)	565 (0.4%)
55	Certain conditions of early infancy	279 (0.2%)	279 (0.2%)	- -	- -	- -	202 (0.1%)	77 (0.1%)	157 (0.1%)	122 (0.1%)
56	Miscellaneous or ill-defined symptoms or conditions	6279 (4.1%)	874 (0.6%)	2372 (1.5%)	1700 (1.1%)	1333 (0.9%)	5503 (3.6%)	776 (0.5%)	3034 (2.0%)	3245 (2.1%)
57	Injuries and adverse external effects	16009 (10.5%)	2551 (1.7%)	7291 (4.8%)	3435 (2.2%)	2732 (1.8%)	13777 (9.0%)	2232 (1.5%)	9320 (6.1%)	6689 (4.4%)
58	A. Fractures	5735 (3.7%)	914 (0.6%)	1841 (1.2%)	1304 (0.9%)	1676 (1.1%)	5113 (3.3%)	622 (0.4%)	3024 (2.0%)	2711 (1.8%)
59	B. Sprains, strains of back and neck	1523 (1.0%)	23 r	911 (0.6%)	467 (0.3%)	122 (0.1%)	1385 (0.9%)	138 (0.1%)	779 (0.5%)	744 (0.5%)
60	C. Lacerations	1928 (1.3%)	290 (0.2%)	1199 (0.8%)	338 (0.2%)	101 (0.1%)	1465 (1.0%)	463 (0.3%)	1397 (0.9%)	531 (0.3%)
61	D. Other	6823 (4.5%)	1324 (0.9%)	3340 (0.2%)	1326 (0.9%)	833 (0.5%)	5814 (3.8%)	1009 (0.7%)	4120 (2.7%)	2703 (1.8%)

Source: Vital and Health Statistics, "Inpatient Utilization of Short-Stay Hospitals," Series 13, No. 12, DHEW (HSM) 73-1763, March, 1973, and Table 8, this report.

r = residual percentage, < 0.1%

- = not applicable

Table 10: Average Length of Stay (ALOS) in Short-Stay Hospitals, 1973, by Age, Race, and Sex Excluding Newborn Infants and Federal Hospitals

Source: Monthly Vital Statistics Report, Hospital Discharge Survey Data, Utilization of Short-Stay Hospitals--Summary of Nonmedical Statistics: U.S., 1973, (HRA) 76-1120, Vol. 24, No. 5, Supplement (2), August 19, 1975

Sex Age	White ALOS	Non-white ALOS	Total ALOS
Male			
< 15	4.3	5.9	4.5
15-44	6.6	8.5	6.8
45-64	9.1	11.9	9.3
65 +	11.6	13.1	11.6
All male	8.2	9.4	8.3
Female			
< 15	4.2	6.8	4.6
15-44	5.2	5.5	5.2
45-64	8.9	10.4	9.0
65 +	12.5	13.7	12.5
All female	7.5	7.3	7.4
Male & Female			
< 15	4.3	6.3	4.5
15-44	5.6	6.2	5.7
45-64	9.0	11.1	9.1
65 +	12.1	13.4	12.1
All	7.8	8.0	7.8

Table 11. Average Length of Stay (ALOS) by Condition In Short-Stay Hospitals, 1973, by Age, Race, and Sex, Excluding Newborn Infants and Federal Hospitals, In Days

	Condition	All Patients	<15	15-44	45-64	65+	White	Nonwhite	Male	Female
1	Total, all conditions	7.8	4.7	5.8	9.1	13.3	7.8	8.1	8.3	7.8
2	Infective and parasitic diseases	9.1	6.2	9.2	11.3	12.2	8.2	14.8	9.7	8.6
3	Neoplasms	10.5	7.1	7.1	9.7	14.6	10.5	11.3	11.4	10.0
4	A. Malignant	14.1	11.0	11.1	12.1	15.5	14.1	16.1	13.9	14.3
5	1. Sex-specific	10.6	-	8.0	9.6	12.9	10.3	12.5	13.2	9.4
6	a. male	13.2	-	-	10.8	13.6	13.1	16.7	13.2	-
7	b. female	9.4	-	8.0	9.4	11.8	9.0	10.9	-	9.4
8	2. Not sex-specific	14.9	11.0	12.5	12.6	16.0	14.8	17.6	14.0	15.7
9	B. Benign	6.2	5.4	5.9	6.6	8.7	6.2	7.0	5.3	6.5
10	1. Sex-specific	7.3	5.9	7.3	7.2	7.4	7.2	8.0	-	7.3
11	a. male	-	-	-	-	-	-	-	-	-
12	b. female	7.3	5.9	7.3	7.2	7.4	7.2	8.0	-	7.3
13	2. Not sex-specific	6.2	5.4	4.4	5.9	8.9	5.4	5.8	5.3	6.5
14	Allergic, endocrine, metabolic and nutritional condition	9.6	6.8	7.0	9.3	13.1	9.3	11.4	9.9	9.4
15	A. Hay fever, asthma	7.6	6.1	5.7	7.3	12.4	7.6	8.4	8.6	6.9
16	B. Diabetes mellitus	11.2	7.1	8.4	10.9	13.3	10.9	13.7	10.9	11.5
17	C. Other	8.1	7.6	6.5	7.8	11.8	7.8	11.2	10.6	7.7
18	Conditions of blood and blood-forming organs	9.8	6.3	9.9	10.1	14.9	9.8	12.1	9.1	10.5
19	Mental, psychoneurotic, and personality disorders	11.2	11.2	10.7	4.3	7.5	10.9	12.9	10.5	11.9
20	Conditions of the nervous system and sense organs	10.1	4.7	8.8	10.1	14.9	10.1	13.2	9.8	10.6
21	A. Conditions of ear and mastoid process	4.0	2.9	4.2	4.3	7.5	4.0	6.8	3.5	4.6
22	B. Cataract and other conditions of eye	6.4	2.9	5.7	4.4	7.7	6.4	7.1	6.1	6.6

Table 11 - Continued

	Condition	All Patients	<15	15-44	45-64	65+	White	Nonwhite	Male	Female
23	C. Other	13.6	10.4	11.6	13.7	18.6	13.4	16.0	13.1	14.0
24	Conditions of the circulatory system	11.7	5.9	9.7	11.1	13.7	11.7	13.2	11.5	12.0
25	A. Congestive heart failure	12.6	6.5	10.8	10.8	13.2	12.8	12.5	11.7	13.4
26	B. Arteriosclerosis	16.1	-	12.0	13.4	17.2	15.8	25.4	15.7	16.6
27	C. Other	12.4	5.7	9.7	11.1	13.6	11.5	12.9	11.4	13.4
28	Conditions of the respiratory system	5.8	3.4	5.4	8.2	12.0	5.8	6.2	5.9	5.6
29	A. Upper respiratory infection, acute	4.8	4.1	4.3	5.6	8.8	4.9	4.6	4.4	5.2
30	B. Pneumonia	9.0	6.2	7.5	9.1	14.1	9.3	8.1	8.3	9.8
31	C. Bronchitis, acute	6.3	4.4	5.2	8.0	9.1	6.3	6.2	6.4	6.3
32	D. Other	4.7	2.4	5.2	8.2	11.3	4.7	6.7	4.7	4.6
33	Conditions of the digestive system	7.5	4.2	6.1	8.4	10.8	7.5	8.2	7.3	7.9
34	A. Ulcers of stomach, duodenum, jejunum	9.8	7.8	7.9	9.8	12.8	9.6	10.4	9.4	10.5
35	B. Appendicitis	6.3	5.3	5.5	8.6	11.1	6.3	6.8	6.0	6.6
36	C. Inguinal hernia	6.6	3.2	6.3	7.5	9.9	6.7	6.6	6.7	5.4
37	D. Cholelithiasis and cholecystitis	10.1	11.1	8.3	9.9	12.6	10.2	10.9	11.0	9.8
38	E. Other	7.0	4.1	5.4	7.8	10.1	7.0	8.0	6.6	7.3
39	Conditions of the genitourinary system	6.6	4.3	5.3	6.8	11.6	6.6	7.4	7.8	6.0
40	A. Cystitis	5.7	3.7	4.6	5.5	9.1	5.5	6.3	6.3	5.6
41	B. Sex-specific	6.7	3.4	5.5	6.6	12.4	6.8	6.5	8.8	5.9
42	1. male	8.8	3.2	5.2	8.0	13.2	9.0	7.7	8.8	-
43	2. female	5.9	4.6	5.5	6.0	10.3	6.0	6.1	-	5.9
44	C. Other	6.7	5.0	5.1	7.3	11.0	7.1	9.1	7.1	6.4
45	Deliveries and complications of pregnancy, childbirth, and pueperium	3.8	3.5	3.8	3.7	-	3.8	3.8	-	3.8

Table 11 - Continued

	Condition	All Pstients	<15	15-44	45-64	65+	White	Nonwhite	Male	Female
46	A. Abortion	3.5	2.9	3.5	2.8	-	3.1	5.9	-	3.5
47	B. Normal delivery	3.8	3.4	3.8	3.8	-	3.9	3.3	-	3.8
48	C. Delivery with complications	4.7	4.3	4.7	5.3	-	4.8	4.5	-	4.7
49	D. Other	2.9	2.8	2.9	-	-	2.9	3.7	-	2.9
50	Conditions of skin and cellular tissues	7.7	4.9	5.7	9.4	13.1	7.5	8.9	7.4	7.9
51	Diseases of bones and organs of movement	10.5	6.6	8.3	9.8	12.8	7.5	10.1	9.2	11.4
52	A. Osteoarthritis	11.3	-	7.6	10.8	12.7	11.3	11.8	10.8	11.7
53	B. Other	10.2	6.6	8.3	9.6	12.9	6.9	9.9	8.9	11.4
54	Congenital malformation	8.6	8.5	7.0	10.3	15.6	8.4	13.7	8.7	8.4
55	Certain conditions of early infancy	9.9	10.8	-	-	-	9.7	13.2	9.0	11.0
56	Miscellaneous or ill-defined symptoms or conditions	6.2	4.0	4.9	6.4	10.3	6.1	7.0	5.8	6.5
57	Injuries and adverse external effects	8.6	5.7	7.3	9.2	18.6	8.7	8.6	7.5	10.1
58	A. Fractures	12.5	7.8	11.2	11.7	23.9	12.8	11.6	10.6	14.7
59	B. Sprains, strsins of back and neck	7.3	5.2	6.9	7.6	9.3	7.3	7.6	6.7	7.9
60	C. Lacerations	5.2	4.3	5.1	6.4	5.6	5.3	5.4	5.1	5.5
61	D. Other	6.6	4.6	6.1	8.1	10.6	6.5	8.3	6.3	7.1

Source: Vital and Health Statistics, "Inpatient Utilization of Short-Stay Hospitals," Series 13, No. 12, DHEW (HSM) 73-1763, March, 1973.

- = Not spplicable

Table 12. Bed Days In Hospital (BDH) Generated by 1974 U.S. Standard Million by Age, Race, and Sex

Source: Calculations based on Tables 8 & 10

Sex / Age	White BDH	White %	Nonwhite BDH	Nonwhite %	Total BDH	Total %
Male						
< 15	37328.3	3.1	9711.4	0.8	47039.7	3.9
15-44	105699.0	8.9	24420.5	2.0	130119.5	10.9
45-64	142506.0	11.9	19230.4	1.6	161736.4	13.5
65 +	159036.0	13.2	15222.2	1.3	174258.2	14.5
All Male	444569.3	37.1	68584.5	5.7	513153.8	42.8
Female						
< 15	27993.0	2.3	8132.8	0.7	36125.8	3.0
15-44	197568.8	16.5	45424.5	3.8	242993.3	20.3
45-64	151157.6	12.6	20883.2	1.8	172040.8	14.4
65 +	215300.0	18.0	18453.9	1.5	233753.9	19.5
All Female	592019.4	49.4	92894.4	7.8	684913.8	57.2
Male +Female						
< 15	65321.3	5.4	17844.2	1.5	83165.5	6.9
15-44	303267.8	25.3	69845.0	5.8	373112.8	31.1
45-64	293663.6	24.5	40113.6	3.4	333777.2	27.9
65 +	374336.0	31.3	33676.1	2.8	408012.1	34.1
All	1036588.7	86.5	161478.9	13.5	1198067.6	100.0

Table 13. Bed Days of Hospital Care (BDH) by Condition Generated by 1974 U.S. Standard Million by Age, Race, and Sex

	Condition	Total	<15	15-44	45-64	65+	White	Nonwhite	Male	Female
1	Total, all conditions	11980676.6 (100.0%)	83165.5 (6.9%)	373112.8 (31.1%)	333777.2 (27.9%)	408012.1 (34.1%)	1036588.7 (86.5%)	161478.9 (13.5%)	573153.8 (42.8%)	684913.8 (57.2%)
2	Infective and parasitic diseases	16050.3 (1.3%)	2731.6 (0.2%)	7040.4 (0.6%)	3486.2 (0.3%)	2792.1 (0.2%)	11447.3 (1.0%)	4602.8 (0.4%)	8669.3 (0.7%)	7381.0 (0.6%)
3	Neoplasms	114127.1 (9.5%)	2514.4 (0.2%)	25721.2 (2.1%)	41862.5 (3.5%)	44029.0 (3.7%)	99824.3 (8.3%)	14302.8 (1.2%)	42145.1 (3.5%)	71982.0 (6.0%)
4	A. Malignant	81402.6 (6.8%)	1207.6 (0.1%)	10158.4 (0.8%)	30206.9 (2.5%)	39829.7 (3.3%)	72100.2 (6.0%)	9302.4 (0.8%)	36350.2 (3.0%)	45052.4 (3.8%)
5	1. Sex-specific	10800.5 (0.9%)	-	2026.7 (0.2%)	2988.9 (0.2%)	5784.9 (0.5%)	8525.5 (0.7%)	2275.0 (0.2%)	4241.6 (0.4%)	6558.9 (0.5%)
6	a. male	4241.6 (0.4%)	-	-	541.1 r	3700.5 (0.3%)	3450.9 (0.3%)	790.7 (0.1%)	4241.6 (0.4%)	-
7	b. female	6558.9 (0.5%)	-	2026.7 (0.2%)	2447.8 (0.2%)	2084.4 (0.2%)	5074.6 (0.4%)	1484.3 (0.1%)	-	6558.9 (0.5%)
8	2. Not sex-specific	70602.1 (5.9%)	1207.6 (0.1%)	8131.7 (0.7%)	27218.0 (2.3%)	34044.8 (2.8%)	63574.7 (5.3%)	7027.4 (0.6%)	32108.6 (2.7%)	38493.5 (3.2%)
9	B. Benign	32724.5 (2.7%)	1306.8 (0.1%)	15562.8 (1.3%)	11655.6 (1.0%)	4199.3 (0.4%)	27724.1 (2.3%)	5000.4 (0.4%)	5794.9 (0.5%)	26929.6 (2.2%)
10	1. Sex-specific	15995.7 (1.3%)	54.4 r	9575.7 (0.8%)	5811.6 (0.5%)	554.0 r	13183.4 (1.1%)	2812.3 (0.2%)	-	15995.7 (1.3%)
11	a. male	- -		-	-	-	-	-	-	-
12	b. female	15995.7 (1.3%)	54.4 r	9575.7 (0.8%)	5811.6 (0.5%)	554.0 r	13183.4 (1.1%)	2812.3 (0.2%)	-	15995.7 (1.3%)
13	2. Not sex-specific	16728.8 (1.4%)	(0.1%)	5987.1 (0.5%)	5844.0 (0.5%)	3645.3 (0.3%)	14540.7 (1.2%)	2188.1 (0.2%)	5794.9 (0.5%)	10933.9 (0.9%)
14	Allergic, endocrine, metabolic, and nutritional conditions	41327.0 (3.4%)	2145.9 (0.2%)	8383.0 (0.7%)	13702.9 (1.1%)	17095.2 (1.4%)	33649.8 (2.8%)	7677.2 (0.6%)	15897.6 (1.3%)	25429.4 (2.1%)
15	A. Hayfever, asthma	5628.6 (0.5%)	894.9 (0.1%)	1154.4 (0.1%)	1537.2 (0.1%)	2042.1 (0.2%)	4133.6 (0.3%)	1495.0 (0.1%)	2670.7 (0.2%)	2957.9 (0.2%)
16	B. Diabetes mellitus	23833.0 (2.0%)	479.8 r	3338.1 (0.3%)	8102.4 (0.7%)	11912.7 (1.9%)	19877.6 (1.7%)	3955.4 (0.3%)	8794.7 (0.7%)	15038.3 (1.3%)
17	C. Other	11865.4 (1.0%)	771.2 (0.1%)	3890.5 (0.3%)	4063.3 (0.4%)	3140.4 (0.3%)	9638.6 (0.8%)	2226.8 (0.2%)	4432.2 (0.4%)	7433.2 (0.6%)
18	Conditions of blood and blood-forming organs	9527.2 (0.8%)	760.1 (0.1%)	1818.7 (0.2%)	1970.2 (0.2%)	4978.2 (0.4%)	7672.8 (0.6%)	1854.4 (0.2%)	3993.6 (0.3%)	5533.6 (0.4%)

Table 13 (con't)

Condition	Total	<15	15-44	45-64	65+	White	Nonwhite	Male	Female
19 Mental, psychoneurotic and personality disorders	49448.3 (4.1%)	2011.9 (0.2%)	33877.9 (2.8%)	7871.5 (0.7%)	5687.0 (0.5%)	42408.6 (3.5%)	7039.7 (0.6%)	20555.7 (1.7%)	28892.6 (2.4%)
20 Conditions of the nervous system and sense organs	86648.7 (7.2%)	4642.0 (0.4%)	10948.0 (0.9%)	19764.9 (1.6%)	52293.8 (4.3%)	75307.3 (6.3%)	11341.4 (0.9%)	39512.2 (3.3%)	47136.5 (3.9%)
21 A. Conditions of ear and mastoid process	4978.1 (0.4%)	1256.3 (0.1%)	1358.3 (0.1%)	1280.5 (0.1%)	1083.0 (0.1%)	4530.4 (0.4%)	447.7 r	2095.1 (0.2%)	2883.0 (0.2%)
22 B. Cataract and other conditions of eye	15355.4 (1.3%)	1180.5 (0.1%)	1652.9 (0.1%)	2571.0 (0.2%)	9951.0 (0.8%)	13849.3 (1.2%)	1506.1 (0.1%)	6952.9 (0.6%)	8402.5 (0.7%)
23 C. Other	66315.2 (5.5%)	2205.2 (0.2%)	7936.8 (0.7%)	14913.4 (1.2%)	41259.8 (3.4%)	56927.6 (4.8%)	9387.6 (0.8%)	30464.2 (2.5%)	35851.0 (3.0%)
24 Conditions of the circulatory system	184414.6 (15.4%)	1666.5 (0.1%)	22833.1 (1.9%)	59998.8 (5.0%)	99916.2 (8.3%)	163021.2 (13.6%)	21393.4 (1.8%)	85804.0 (7.5%)	98610.6 (8.2%)
25 A. Congestive heart failure	12634.9 (1.1%)	33.0 r	252.6 r	2130.6 (0.2%)	10218.7 (0.9%)	10807.7 (0.9%)	1827.2 (0.2%)	5564.3 (0.5%)	7070.6 (0.6%)
26 B. Arteriosclerosis	6323.1 (0.5%)	- -	146.0 r	1154.6 (0.1%)	5022.5 (0.4%)	5495.0 (0.5%)	828.1 (0.1%)	3097.5 (0.3%)	3225.6 (0.3%)
27 C. Other	165456.6 (13.8%)	1633.5 (0.1%)	22434.5 (1.9%)	56713.6 (4.7%)	84675.0 (7.1%)	146718.5 (12.2%)	18738.1 (1.6%)	77142.2 (6.4%)	88314.4 (7.4%)
28 Conditions of the respiratory system	97127.9 (8.1%)	22867.8 (1.9%)	18994.9 (1.6%)	20461.6 (1.7%)	34803.6 (2.9%)	84837.2 (7.0%)	12290.7 (1.0%)	48625.4 (4.1%)	48502.5 (4.0%)
29 A. Upper respiratory infection, acute	9652.2 (0.8%)	4179.3 (0.3%)	2009.8 (0.2%)	1311.4 (0.1%)	2151.7 (0.2%)	8634.8 (0.7%)	1017.4 (0.1%)	4478.6 (0.4%)	5173.6 (0.4%)
30 B. Pneumonia	32491.5 (2.7%)	7798.1 (0.7%)	3910.7 (0.3%)	5698.6 (0.5%)	15084.1 (1.3%)	28064.4 (2.3%)	4427.1 (0.4%)	15941.8 (1.3%)	16549.7 (1.4%)
31 C. Bronchitis, acute	6055.5 (0.5%)	1358.4 (0.1%)	877.4 (0.1%)	1921.4 (0.2%)	1898.3 (0.2%)	5512.2 (0.5%)	543.3 r	3109.2 (0.3%)	2946.3 (0.2%)
32 D. Other	48928.7 (4.0%)	9532.0 (0.8%)	12197.0 (1.0%)	11530.2 (1.0%)	15669.5 (1.3%)	42625.8 (3.6%)	6302.9 (0.5%)	25095.8 (2.1%)	23832.9 (2.0%)

Table 13 (con't)

Condition	Total	<15	15-44	45-64	65+	White	Nonwhite	Male	Female
33 Conditions of the digestive system	157132.4 (13.1%)	9880.6 (0.8%)	42499.6 (3.5%)	53962.0 (4.5%)	50790.2 (4.2%)	140769.9 (11.7%)	16362.5 (1.4%)	74560.2 (6.2%)	82572.2 (6.9%)
34 A. Ulcers of stomach, duodenum, jujunum	22752.2 (1.9%)	193.5 r	6171.7 (0.5%)	9012.4 (0.8%)	7374.6 (0.6%)	20170.3 (1.7%)	2581.9 (0.2%)	13266.0 (1.1%)	9486.2 (0.8%)
35 B. Appendicitis	10995.5 (0.9%)	3005.3 (0.3%)	5574.8 (0.5%)	1471.4 (0.1%)	944.0 (0.1%)	9813.7 (0.8%)	1181.8 (0.1%)	5856.4 (0.5%)	5139.1 (0.4%)
36 C. Inguinal herina	17075.4 (1.4%)	1649.7 (0.1%)	3848.0 (0.3%)	6668.1 (0.6%)	4909.6 (0.4%)	15534.5 (1.3%)	1540.9 (0.1%)	15575.4 (1.3%)	1500.0 (0.1%)
37 D. Cholelithiasis cholecystitis	25392.2 (2.1%)	52.7 r	6300.5 (0.5%)	9594.1 (0.8%)	9444.9 (0.8%)	23881.9 (2.0%)	1510.3 (0.1%)	7266.6 (0.6%)	18125.6 (1.5%)
38 E. other	80917.1 (6.8%)	4979.4 (0.4%)	20604.6 (1.7%)	27216.0 (2.3%)	28117.1 (2.3%)	71369.5 (6.0%)	9547.6 (0.7%)	32595.8 (2.7%)	48321.3 (4.0%)
39 Conditions of genitourinary system	93454.9 (7.8%)	4447.4 (0.4%)	35758.7 (3.0%)	25349.6 (2.1%)	27899.2 (2.3%)	80527.3 (6.7%)	12927.6 (1.1%)	36990.2 (3.1%)	56464.7 (4.7%)
40 A. Cystitis	5281.3 (0.4%)	370.6 r	1563.3 (0.1%)	1302.7 (0.1%)	2044.7 (0.2%)	4711.4 (0.4%)	569.9 r	1348.8 (0.1%)	3932.5 (0.3%)
41 B. Sex-specific	52702.2 (4.4%)	1187.1 (0.1%)	22817.8 (1.9%)	12883.8 (1.1%)	15813.5 (1.3%)	45223.7 (3.8%)	7478.5 (0.6%)	19084.8 (1.6%)	33617.4 (2.8%)
42 1. male	19084.8 (1.6%)	940.4 (0.1%)	1773.9 (0.1%)	4353.2 (0.4%)	12016.9 (1.0%)	16695.2 (1.4%)	2389.2 (0.2%)	19084.8 (1.6%)	- -
43 2. female	33617.4 (2.8%)	246.7 r	21043.2 (1.8%)	8530.6 (0.7%)	3796.6 (0.3%)	28527.8 (2.4%)	5089.3 (0.4%)	- -	33617.4 (2.8%)
44 C. Other	35471.4 (3.0%)	2889.7 (0.2%)	11377.6 (0.9%)	11163.1 (0.9%)	10041.0 (0.8%)	30592.2 (2.6%)	4879.2 (0.4%)	16556.6 (1.4%)	18914.8 (1.6%)
45 Deliveries and complications of pregnancy, childbirth, and puerperium	84857.2 (7.1%)	285.2 r	84390.6 (7.0%)	181.4 r	- -	67419.3 (5.6%)	17437.9 (1.5%)	- -	84857.2 (7.1%)
46 A. Abortion	5913.1 (0.5%)	14.0 r	5867.1 (0.5%)	32.2 r	.. -	3844.9 (0.3%)	2068.4 (0.2%)	- -	5913.3 (0.5%)
47 B. Normal delivery	54615.5 (4.5%)	124.3 r	54377.8 (4.5%)	113.4 r	- -	45636.3 (3.8%)	8979.2 (0.7%)	- -	54615.1 (4.5%)
48 C.Delivery with complication	16306.6 (1.4%)	103.9 r	16166.9 (1.3%)	35.8 r	.. -	12119.7 (1.0%)	4186.9 (0.3%)	- -	16306.6 (1.4%)

Table 13 (con't)

Condition	Total	<15	15-44	45-64	65+	White	Nonwhite	Male	Female
49 D. Other	8021.8 (0.7%)	43.0 r	7978.8	-	-	5818.4 (0.5%)	2203.4 (0.2%)	-	8021.8 (0.7%)
50 Conditions of skin and cellular tissues	15891.2 (4.5%)	1424.8 (0.1%)	4752.6 (0.4%)	5078.5 (0.4%)	4635.3 (0.4%)	13095.4 (1.1%)	2795.8 (0.2%)	8264.7 (0.7%)	7626.5 (0.6%)
51 Diseases of bones and organs of movement	54478.3 (4.5%)	2461.7 (0.2%)	17454.0 (1.5%)	20109.7 (1.7%)	14452.9 (1.2%)	47856.8 (4.0%)	6621.5 (0.6%)	22101.4 (1.8%)	32376.9 (2.7%)
52 A. Osteoarthritis	7577.9 (0.6%)	- -	552.3 r	2932.8 (0.2%)	4092.8 (0.3%)	7057.2 (0.6%)	520.7 r	2963.8 (0.2%)	4614.1 (0.4%)
53 B. Other	46900.4 (3.9%)	2461.7 (0.2%)	16901.7 (1.4%)	17176.9 (1.4%)	10360.1 (0.9%)	40799.6 (3.4%)	6100.8 (0.5%)	19137.6 (1.6%)	27762.8 (2.3%)
54 Congenital malformations	10417.5 (0.9%)	5560.8 (0.5%)	2437.4 (0.2%)	1521.5 (0.1%)	897.8 (0.1%)	8853.7 (0.7%)	1563.8 (0.1%)	5832.6 (0.5%)	4584.9 (0.4%)
55 Certain conditions of early infancy	2817.6 (0.2%)	2817.6 (0.2%)	- -	- -	- -	1855.2 (0.2%)	962.4 (0.1%)	1445.8 (0.1%)	1371.8 (0.1%)
56 Miscellaneous or ill-defined symptons or conditions	39712.6 (3.3%)	3494.6 (0.3%)	11618.2 (1.0%)	10875.6 (0.9%)	13724.2 (1.1%)	34181.6 (2.9%)	5531.0 (0.5%)	17691.9 (1.5%)	22020.7 (1.8%)
57 Injuries and adverse external effects	140634.8 (11.7%)	13742.7 (1.1%)	51025.8 (4.3%)	30036.0 (2.5%)	45830.3 (3.8%)	121516.8 (10.1%)	19118.0 (1.6%)	71597.4 (6.0%)	69037.4 (5.8%)
58 A. Fractures	73128.9 (6.1%)	6277.0 (0.5%)	18154.3 (1.5%)	13432.6 (1.1%)	35265.0 (2.9%)	65867.3 (5.5%)	7261.6 (0.6%)	32599.5 (2.7%)	40529.4 (3.4%)
59 B. Sprains, strains of back and neck	11341.4 (0.9%)	124.5 r	6342.0 (0.5%)	3694.0 (0.3%)	1180.9 (0.1%)	10275.3 (0.9%)	1066.1 (0.1%)	5334.4 (0.4%)	6007.0 (0.5%)
60 C. Lacerations	10227.2 (0.9%)	1263.6 (0.1%)	6198.5 (0.5%)	2192.0 (0.2%)	573.1 r	7736.3 (0.6%)	2490.9 (0.2%)	7253.5 (0.6%)	2973.7 (0.2%)
61 D. Other	45937.3 (3.8%)	6077.6 (0.5%)	20331.0 (1.7%)	10717.4 (0.9%)	8811.3 (0.7%)	37637.9 (3.1%)	8299.4 (0.7%)	26410.0 (2.2%)	19527.3 (1.6%)

Source: Table 9 and Table 11, this report.

Table 14. 1990 U.S. Standard Million, based on Series E Projection

Source: Calculations based on Current Population Reports,"Population Estimates and Projections," Series P-25, No. 493, December .

Sex Age	White	Nonwhite	Total
Male			
< 15	104748	19761	124509
15-44	202769	29306	232075
45-64	77972	8575	86547
65 +	40727	4201	44928
All Male	426216	61843	488059
Female			
< 15	99745	19506	119251
15-44	197409	31820	229229
45-64	85765	10039	95804
65 +	61896	5761	67657
All Female	444815	67126	511941
Male & Female			
< 15	204492	39268	243760
15-44	400179	61125	461304
45-64	163737	18614	182351
65 +	102623	9962	112585
All	871031	128969	1000000

Table 15: 1990 U.S. Standard Million, based on Series C Projection

Source: Calculations based on Current Population Reports, "Population Estimates and Projections," Series P-25, No. 493, December, 1972, Table 2.

Sex Age	White	Nonwhite	Total
Male			
< 15	125561	23686	149247
15-44	191082	27613	218695
45-64	72233	7944	80177
65 +	37733	3888	41621
All Male	426609	63131	489740
Female			
< 15	119547	23378	142925
15-44	185936	29970	215906
45-64	79452	9300	88752
65 +	57344	5333	62677
All Female	442279	67981	510260
Male & Female			
< 15	245109	47063	292172
15-44	377018	57584	434602
45-64	151684	17244	168928
65 +	95077	9221	104298
All	868888	131112	1000000

Table 16: 2000 U.S. Standard Million, based on Series E Projection

Source: Calculations based on Current Population Reports, Population Estimates and Projections, Series P-25, No. 493, December, 1972.

Sex Age	White	Nonwhite	Total
Male			
< 15	97021	18304	115325
15-44	196133	28348	224481
45-64	95674	10521	106195
65 +	39436	4065	43501
All Male	428264	61238	489502
Female			
< 15	92358	18061	110419
15-44	189859	30602	220461
45-64	102100	11950	114050
65 +	59986	5582	65568
All Female	444303	66195	510498
Male & Female			
< 15	189379	36365	225744
15-44	385992	58950	444942
45-64	197774	22471	220245
65 +	99422	9647	109069
All	872567	127433	1000000

Table 17: 2000 U.S. Standard Million, based on Series C Projection

Source: Calculations based on Current Population Reports, Population Estimates and Projections, Series P-25, No. 493, December, 1972.

Sex Age	White	Nonwhite	Total
Male			
< 15	118440	22343	140783
15-44	191753	27712	219465
45-64	84216	9261	93477
65 +	34713	3578	38291
All Male	429122	62894	492016
Female			
< 15	112724	22043	134767
15-44	185252	29860	215112
45-64	89871	10519	100390
65 +	52802	4913	57715
All Female	440649	67335	507984
Male & Female			
< 15	231164	44386	275550
15-44	377005	57572	434577
45-64	174087	19780	193867
65 +	87515	8491	96006
All	869771	130229	1000000

Table 18: Number of Physician Visits Generated by 1990 U.S. Standard Million by Age, Race, and Sex (Series E Projection)

Source: Table 2 and Table 14, this report.

Sex / Age	White Visits	%	Nonwhite Visits	%	Total Visits	%
Male						
< 15	513265.2	10.4	65211.3	1.3	578476.5	11.7
15-44	709691.5	14.3	93779.2	1.9	803470.7	16.2
45-64	366468.4	7.4	37730.0	0.8	404198.4	8.2
65 +	252507.4	5.1	28146.7	0.6	280654.1	5.7
All Male	1841932.5	37.2	224867.2	4.5	2066799.7	41.8
Female						
< 15	428903.5	8.7	56567.4	1.1	485470.9	9.8
15-44	1164701.3	23.5	171828.0	3.5	1336529.3	27.0
45-64	506013.5	10.2	73284.7	1.5	579298.2	11.7
65 +	439461.6	8.9	42631.4	0.9	482093.0	9.7
All Female	2539079.9	51.3	344311.5	7.0	2883391.4	58.2
Male & Female						
< 15	942168.7	19.0	121778.7	2.5	1063947.4	21.5
15-44	1874392.8	37.9	265607.2	5.4	2140000.0	43.2
45-64	872481.9	17.6	111014.7	2.2	983496.6	19.9
65 +	691969.0	14.0	70778.1	1.4	762747.1	15.4
All	4381012.4	88.5	569178.7	11.5	4950191.1	100.0

Table 19: Number of Physician Visits Generated by 1990 U.S. Standard Million by Age, Race, and Sex (Series C Projection)

Source: Table 2 and Table 15, this report.

Sex / Age	White Visits	%	Nonwhite Visits	%	Total Visits	%
Male						
< 15	615248.9	12.5	78163.8	1.6	693412.7	14.1
15-44	668787.0	13.6	88361.6	1.8	757148.7	15.4
45-64	339495.1	6.9	34953.6	0.7	374448.7	7.6
65 +	233944.6	4.8	26049.6	0.5	259994.2	5.3
All Male	1227475.6	25.0	227528.6	4.6	2085004.2	42.5
Female						
< 15	514052.1	10.5	67796.2	1.4	581848.3	11.9
15-44	1097022.4	22.3	161838.0	3.3	1258860.4	25.6
45-64	468766.8	9.5	67890.0	1.4	536656.8	10.9
65 +	407142.4	8.3	39464.2	0.8	446606.6	9.1
All Female	2486983.7	50.7	336988.4	6.9	2823972.1	57.5
Male & Female						
< 15	1129301.0	23.0	145960.0	3.0	1275261.0	26.0
15-44	1765809.4	36.0	250199.6	5.1	2016009.0	41.1
45-64	808261.9	16.5	102843.6	2.1	911105.5	18.6
65 +	641087.0	13.1	65513.8	1.3	706600.8	14.4
All	4344459.3	88.5	564517.0	11.5	4908976.3	100.0

Table 20: Number of Physician Visits Generated by 2000 U.S. Standard Million by Age, Race, and Sex (Series E Projection)

Source: Table 7 and Table 16, this report.

Sex / Age	White		Nonwhite		Total	
	Visits	%	Visits	%	Visits	%
Male						
<15	475402.9	9.3	60403.2	1.2	535806.1	10.5
15-44	686465.5	13.4	90713.6	1.8	777179.1	15.2
45-64	449667.8	8.8	46292.4	0.9	495960.2	9.7
65 +	244503.2	4.8	27235.5	0.5	271738.7	5.3
All Male	1856039.4	36.3	224644.7	4.4	2080684.1	40.7
Female						
< 15	452554.2	8.8	65019.6	1.3	517573.8	10.1
15-44	1158139.9	22.7	189732.4	3.7	1347872.3	26.4
45-64	612600.0	12.0	87235.0	1.7	699835.0	13.7
65 +	425900.6	8.3	41306.8	0.8	467207.4	9.1
All Female	2649194.7	51.8	383293.8	7.5	3032488.5	59.3
Male & Female						
< 15	927957.1	18.1	125422.8	2.5	1053379.9	20.6
15-44	1844605.4	36.1	280446.0	5.5	2125051.4	41.5
45-64	1062267.8	20.8	133527.4	2.6	1195795.2	23.4
65 +	670403.8	13.1	68542.3	1.3	738946.1	14.5
All	4505234.1	88.1	607938.5	11.9	5113172.6	100.0

Table 21: Number of Physician Visits Generated by 2000 U.S. Standard Million by Age, Race, and Sex (Series C Projection)

Source: Table 2 and Table 17, this report.

Sex / Age	White Visits	White %	Nonwhite Visits	Nonwhite %	Total Visits	Total %
Male						
< 15	580356.0	11.5	73731.9	1.5	654087.9	12.9
15-44	671135.5	13.3	88678.4	1.8	759813.9	15.0
45-64	395815.2	7.8	40748.4	0.8	436563.6	8.6
65 +	215220.6	4.3	23972.6	0.5	239193.2	4.7
All Male	1862527.3	36.8	227131.3	4.5	2089658.6	41.3
Female						
< 15	552347.6	10.9	79354.8	1.6	631702.4	12.5
15-44	1130037.2	22.3	185132.0	3.7	1315169.2	26.0
45-64	539226.0	10.6	76788.7	1.5	616014.7	12.2
65 +	374894.2	7.4	36356.2	0.7	411250.4	8.1
All Female	2596505.0	51.2	377631.7	7.5	2974136.7	58.7
Male & Female						
< 15	1132703.6	22.4	153086.7	3.0	1285790.3	25.4
15-44	1801172.7	35.6	273810.4	5.4	2074983.1	41.0
45-64	935041.2	18.5	117537.1	2.3	1052578.3	20.8
65 +	590114.8	11.7	60328.8	1.2	650443.6	12.8
All	4459032.3	88.1	604763.0	11.9	5063795.3	100.0

Table 22: Number of Discharges Generated by 1990 U.S. Standard Million by Age, Race, and Sex (Series E Projection)

Source: Table 7 and 14, this report.

Sex Age	White	Nonwhite	Total
Male			
< 15	8222.7	1559.1	9781.8
15-44	17154.3	3077.1	20231.4
45-64	13863.4	1431.2	15294.6
65 +	14555.8	1234.7	15790.5
All Male	53796.2	7302.1	61098.3
Female			
< 15	6293.9	1129.4	7423.3
15-44	39916.1	8677.3	48593.4
45-64	15249.0	1803.0	17052.0
65 +	19218.7	1503.0	20721.7
All Female	80677.7	13112.7	93790.4
Male & Female			
< 15	14516.6	2688.5	17205.1
15-44	57070.4	11754.4	68824.8
45-44	29112.4	3234.2	32346.6
65 +	33774.5	2737.7	36512.2
All	134473.9	20414.8	154888.7

Table 23: Number of Discharges Generated by 1990 U.S. Standard Million by Age, Race, and Sex (Series C Projection)

Source: Table 7 and Table 15, this report.

Sex / Age	White	Nonwhite	Total
Male			
< 15	9856.5	1868.8	11725.3
15-44	16165.5	2899.4	19064.9
45-64	12843.0	2143.5	14986.5
65 +	13485.8	1142.7	14628.5
All Male	52350.8	8054.4	60405.2
Female			
< 15	7543.4	1353.6	8897.0
15-44	37596.3	8172.8	45769.1
45-64	14126.6	1670.3	15796.9
65+	17805.3	1391.4	19196.7
All Female	77071.6	12588.1	89659.7
Male & Female			
< 15	17399.9	3222.4	20622.3
15-44	53761.8	11072.2	64834.0
45-64	26969.6	3813.8	30783.4
65 +	31291.1	2534.1	33825.2
All	129422.4	20642.5	150064.9

Table 24: Number of Discharges Generated by 1990 U.S. Standard Million by Age, Race, and Sex (Series E Projection)

Source: Table 7 and Table 16, this report.

Sex / Age	White		Nonwhite		Total	
	persons	discharges	persons	discharges	persons	discharges
Male						
< 15	97021	7616	18304	1444	115325	9060
15-44	196133	16593	28348	2977	224481	19570
45-64	95674	17011	10521	1756	106195	18767
65 +	39436	14094	4065	1195	43501	15289
All Male	428264	55314	61238	7372	489502	62686
Female						
< 15	92358	5828	18061	1046	110419	6874
15-44	189859	38389	30602	8345	220461	46734
45-64	102100	18153	11950	2146	114050	20299
65 +	59986	18626	5582	1456	65568	20082
All Female	444303	80996	66195	12993	510498	93989
Male & Female						
< 15	189379	13444	36365	2490	225744	15934
15-44	385992	54982	58950	11322	444942	66304
45-64	197774	35164	22471	3902	220245	39066
65 +	99422	32720	9647	2651	109069	35371
All	872567	136310	127433	20365	1000000	156675

Table 25: Number of Discharges Generated by 2000 J.S. Standard Million by Age, Race, and Sex (Series C Projection)

Source: Table 7 and Table 17, this report.

Sex / Age	White		Nonwhite		Total	
	persons	discharges	persons	discharges	persons	discharges
Male						
< 15	118440	9298	22343	1763	140783	11061
15-44	191753	16222	27712	2910	219465	19132
45-64	84216	14974	9261	1546	93477	16520
65 +	34713	12406	3578	1052	38291	13458
All Male	429122	52900	62894	7271	492016	60171
Female						
< 15	112724	7113	22043	1276	134767	8389
15-44	185252	37458	29860	8143	215112	45601
45-64	89871	15979	10519	1889	100390	17868
65 +	52802	16395	4913	1282	57715	17677
All Female	440649	76945	67335	12590	507984	89535
Male & Female						
< 15	231164	16411	44386	3039	275550	19450
15-44	377005	53680	57572	11053	434577	64733
45-64	174087	30953	19780	3435	193867	34388
65 +	87515	28801	8491	2334	96006	31135
All	869771	129845	130229	19861	1000000	149706

Table 26: Bed Days In Hospital Generated by 1990 U.S. Standard Million by Age, Race, and Sex (Series E Projection)

Source: Table 10 and Table 14, this report.

Sex / Age	White BDH	%	Nonwhite BDH	%	Total BDH	%
Male						
< 15	42383.0	3.6	11025.9	0.9	53408.9	4.6
15-44	106692.3	9.2	24644.9	2.1	131337.2	11.3
45-64	116871.3	10.0	25507.7	2.2	142379.0	12.2
65 +	156435.3	13.4	14969.4	1.3	171404.7	14.7
All Male	422381.9	36.3	76147.9	6.5	498529.8	42.8
Female						
< 15	31682.3	2.7	9204.5	0.8	40886.8	3.5
15-44	195500.8	16.8	44950.4	3.9	240451.2	20.6
45-64	125726.7	10.8	17371.1	1.5	143097.8	12.3
65 +	222566.3	19.1	19062.2	1.6	241628.5	20.7
All Female	575476.1	49.4	90588.2	7.8	666064.3	57.1
Male&Female						
< 15	74065.3	6.4	20230.4	1.7	94295.7	8.1
15-44	302193.1	25.9	69595.3	6.0	371788.4	31.9
45-64	242598.0	20.8	42878.8	3.7	285476.8	24.5
65 +	379001.6	32.5	34031.6	2.9	413033.2	35.5
All	997858.0	85.7	166736.1	14.3	1164594.1	100.0

Table 27: Bed Days In Hospital Generated by 1990 U.S. Standard Million by Age, Race, and Sex (Series C Projection)

Source: Table 10 and Table 15, this report.

Sex / Age	White BDH	%	Nonwhite BDH	%	Total BDH	%
Male						
< 15	35357.6	2.9	9198.7	0.8	44556.3	3.7
15-44	113218.4	9.3	26155.4	2.1	139373.8	11.5
45-64	126156.9	10.4	17031.3	1.4	143188.2	11.8
65 +	168847.3	13.9	16174.6	1.3	185021.9	15.2
All Male	443580.2	36.5	68560.0	5.6	512140.2	42.1
Female						
< 15	26434.4	2.2	7679.9	0.6	341143.3	2.8
15-44	207563.7	17.1	47725.2	3.9	255288.9	21.0
45-64	135716.1	11.2	18751.2	1.5	154467.3	12.7
65 +	240233.8	19.7	20591.1	1.7	260824.9	21.4
All Female	609948.0	50.1	94747.4	7.8	704695.4	57.9
Male & Female						
< 15	61792.0	5.1	16878.6	1.4	78670.6	6.5
15-44	320782.1	26.4	73880.6	6.1	394662.7	32.4
45-64	261873.0	21.5	35782.5	2.9	297655.5	24.5
65 +	409081.1	33.6	36765.7	3.0	445846.8	36.6
All	1053528.2	86.6	163307.4	13.4	1216835.6	100.0

Table 28: Bed Days In Hospital Generated by 2000 U.S. Standard Million by Age, Race, and Sex (Series E Projection)

Source: Table 10 and Table 24, this report.

Sex / Age	White BDH	White %	Nonwhite BDH	Nonwhite %	Total BDH	Total %
Male						
< 15	32748.8	2.6	8519.6	0.7	41268.4	3.3
15-44	109513.8	8.8	25304.5	2.0	134818.3	10.8
45-64	154800.1	12.5	19316.0	1.6	174116.1	14.0
65 +	163490.4	13.2	15654.5	1.3	179144.9	14.4
All Male	460553.1	37.0	68794.6	5.5	529347.7	42.6
Female						
< 15	24477.6	2.0	7112.8	0.6	31590.4	2.5
15-44	199622.8	16.1	45897.5	3.7	245520.3	19.8
45-64	161561.7	13.0	22318.4	1.8	183880.1	14.8
65 +	232825.0	18.7	19947.2	1.6	252772.2	20.3
All Female	618487.1	49.8	95275.9	7.7	713763.0	57.4
Male & Female						
< 15	57226.4	4.6	15632.4	1.3	72858.8	5.9
15-44	309136.6	24.9	71202.0	5.7	200678.6	30.6
45-64	316361.8	25.4	41634.4	3.3	357996.2	28.8
65 +	396315.4	31.9	35601.7	2.9	431917.1	34.7
All	1079040.7	86.8	164070.5	13.2	1243110.7	100.0

Table 29: Bed Days In Hospital Generated by 2000 U.S. Standard Million by Age, Race, and Sex (Series C Projection)

Source: Table 10 and Table 25, this report.

Sex / Age	White BDH	White %	Nonwhite BDH	Nonwhite %	Total BDH	Total %
Male						
< 15	39981.4	3.4	10401.7	0.9	50383.1	4.3
15-44	107065.2	9.2	24735.0	2.1	131800.2	11.3
45-64	136263.4	11.7	18397.4	1.6	154660.8	13.2
65 +	143909.6	12.3	13781.2	1.2	157690.8	13.5
All Male	427219.6	36.6	67315.3	5.8	494534.9	42.4
Female						
< 15	29874.6	2.6	8676.8	0.7	38551.4	3.3
15-44	194781.6	16.7	55372.4	4.7	250154.0	21.4
45-64	142213.1	12.2	19645.6	1.7	161858.7	13.9
65 +	204937.5	17.6	17563.4	1.5	222500.9	19.1
All Female	571806.8	49.0	101258.2	8.7	673065.0	57.6
Male & Female						
< 15	69856.0	6.0	19078.5	1.0	88934.5	7.6
15-44	301846.8	25.9	80107.4	6.9	381954.2	32.7
45-64	278476.5	23.9	38043.0	3.3	316519.5	27.1
65 +	348847.1	29.9	31344.6	2.7	380191.7	32.6
All	999026.4	85.6	168573.5	14.4	1167599.9	100.0

CHANGING PATTERNS OF HEALTH CARE NEEDS

Michael Durfee

Economists remind us that one of the central problems of the health care system today is the allocation of scarce resources which will satisfy the "needs" and "demands" of the consumer.[1,2] Specification of the health care "needs" and "demands" of the public, however, is extremely difficult. There is little consensu as to what kind of care by whom is needed to maximize the chance for health. Assessing what people are willing and able to pay for, technically termed demand, seems a more pragmatic concept, but in medical care this is heavily influenced by what the provider recommends, what third parties will cover, and by our traditional classifications of disease and illness.

Despite these uncertainties, health manpower and facilities planning are often linked to the reasons given for patients visits to physicians as measured, for example, by the National Ambulatory Care Survey. (Table I) This assumes that diseases as specified by the survey are unvarying and that the classification accurately reflects the health care problems of today's and future populations. However, the list of diseases as used by the National Ambulatory Care Survey may well be an antiquated classification of "old morbidity" which fails to acknowledge the changing health problems in today's society.

Rene Dubos, almost twenty years ago, reminded us that the secular trend of disease is characterized by changing degrees of virulence (e.g., scarlet fever was becoming less of a threat even before the discovery of its specific therapy — penicillin). He selected from history examples of other diseases, such as tuberculosis that were fading from the scene even before the introduction of specific chemotherapy.[3] New diseases such as asbestosis accompanied industrialization. Today, it is clear that conditions related to our modern life-style are the major causes of morbidity and mortality.

Nevertheless, patients continue to offer "chief complaints" couched in the vocabulary of the "old morbidity" long after it has become obsolete. Patients inquire about "quarantine measures" following a diagnosis of scarlet fever. It is "common knowledge" that removing the tonsils will help a child "grow better" and decrease the frequency of "colds" and "sore throats." (Thus, tonsillectomy and adenoidectomy remains the most frequent operation in the United States, despite the fact that there are few indications of the efficacy of such surgery.) Folklore, sometimes with physician reinforcement, promotes the notion that it is important to have a "cold" checked so that "it won't go into pnuemonia." On a public level state tuberculosis sanitoriums persist long after the "need" for them has passed.

These illustrations of "old morbidity" would remain quaint anecdotes if it were not for the fact that they are often interpreted as "needs" from which it is assumed that manpower projections can be made.

Significantly, nowhere on the Survey can one find such items as "having trouble coping," or "marriage coming apart at the seams," or "child having trouble learning." Doubtless, they are filed away under the "neurosis" or "other" categories, but this obscures the fact that these conditions <u>are</u> the dis-eases of the next quarter century and deserve a separate taxonomy of their own.[4,5] It can be argued that these dis-eases are not medical problems, or that physicians are increasingly "medicalizing life." Yet clearly psychosocial disorders are a major source underlying problems brought to the physician.

Haggerty in the United States and LaLonde in Canada are pressing for the acknowledgement of the existence of a "new morbidity"[6] (Table V) and a concommitant "new perspective"[7] on health care. This "new morbidity" includes the major sources of disease and death now and in the foreseeable future. It includes such diverse problems as accidents, obesity, alcoholism, learning problems, and suicide.

It recognizes that the true "needs" of the consumer in the latter part of the twentieth century will include the amelioration of stress, accident prevention, and environmental clean-up. It emphasizes health promotion and argues for health care (rather than just illness care) programs, facilities, and manpower to accommoda a new taxonomy of disease. It underscores the point that, like automobile styles, wearing apparel fashions, and word usage patterns, health care needs change with time.

If the "new morbidity" does exist, why has not the public demanded that physicians take responsibility for providing care in this area of need? Why has not the consumer requested insurance coverage to include diseases classified as "new morbidity?" Why have not medical schools stressed this diverse group of problems in their curricula? The answers to these questions are complex but perhaps include these factors: 1) categorical program financing has emphasized a more traditional concept of disease; 2) there is little enthusiasm among medical schools for prevention-oriented versus disease-oriented health care; 3) the medical profession places little credence in health education; 4) people often place a higher priority on pleasure and convenience than on health.

One reason for lack of acceptance of the concept of "new morbidity" is a semantic one. The nomenclature of traditional disease is well known both to the patient and to the physician. It has successfully served as a "ticket of admission" to the health care system in the past. The vocabulary of the "new morbidity," on the other hand, is not well known by the consumer, whose "dis-ease" is thus not viewed in these terms.

Physicians accustomed to seeing patients on a one-to-one basis often have not contemplated this changing disease pattern; they often remain unaware of the new diseases responsible for much of today's morbidity and mortality. If disease from the "new morbidity" is recognized, fatalism may preclude further investigation and

treatment. The physician working with individual patients generally has had scant and frustrating experience in effecting life-style changes. Behavior modification, group therapy, and health education are not part of the therapeutic armamentarium of the average primary care physician. The importance of psychosocial conditions have only recently been recognized as underlying factors in a wide range of diseases.(8)

Gaining a "new perspective" on health is threatening both to the consumer and to the medical profession. "To ward off disease or recover health, men as a rule find it easier to depend upon healers than to attempt the more difficult task of living wisely."(9) A significant tenet of the "new perspective" on health care is returning responsibility for health maintenance to the patient. This will require that the physician share his expertise.

To accomplish the transition from emphasis upon illness care to health care, and from the "old morbidity" to the "new morbidity," both the health care practitioner and the system will need to change. For example, learning problems of children often require the diagnostic and therapeutic skills of several health professionals. The role of the physician as coordinator and collaborator will need to be stressed in medical school curricula. As the medical sociologist R.N. Wilson has stated: "A paramount issue of the future may be the redefinition of the doctor's role as a collaborative one and the patterning of team medicine for maximum therapeutic efficacy. The future medical practice will probably rest upon a detailed meshing of medicine, nursing, social work, administration, and perhaps even social science."(10)

Interface problems (Figure 1) may well occupy the majority of the primary care physician's time in the next two decades. To deal effectively with these problems the health professional will be drawn towards viewing "the community as a patient." For example, in order to provide psychosocial support to patients at

high risk (e.g. recently widowed, family with a child with chronic disease and an executive with a job change) it will be necessary to consider those persons who do not necessarily present to the physician's office for treatment. Psychosocial support functions will require the continued development of new roles such as "health facilitators"(11) and "health visiting."(11a) "Helping relationships in the future are unlikely to be confined to therapeutic arenas -- the physician's office or hospital bedside -- in which the helper can stage-manage and manipulate at will."(12)

An example of an interface area ready for cultivation is school health. There are 94 million people under the age of 25 years (45% of population) in the United States today. Yet there are few models for physician involvement in school systems.(13) Potentially, a large percentage of this population could benefit from physician involvement in the "occupational health" of school children and young adults. Health education, screening programs, and counseling could be accomplished by a shift of emphasis from office based care to community care.

If the "old morbidity" continues to be legitimatized by equating it with consumer "demands," and if manpower allocations continue to be pegged to these demands, then it will continue to be necessary to finance the expensive diagnostic and therapeutic technology to accommodate this classification of disease. Illness care will continue to be emphasized above health care. Largely unnecessary surgery will continue to be financed by third party payment. The "demands" of the consumer, unmodified by health education, may prove to be insatiable.

Our national health policy must assess what proportion of the personnel responding to the needs created by the 'new morbidity' are appropriately included as health manpower. While there is no easy way to put a number on this requirement, we should anticipate that:

a.) psychosocial problems will be the major diseases of the next quarter century;

b.) the roles of physicians and other "caring professionals" will require redefinition if these needs are to be met efficiently and effectively;

c.) health education will become increasingly important if responsibility for health maintenance is returned to the patient.

Table 1

"OLD MORBIDITY"

DIAGNOSES	US	%
All Visits	4952626	
Medical & special exams	304218	6.1
Medical & surgical aftercare	248420	5.0
Prenatal Care	194751	3.9
Essential benign hypertension	174730	3.5
Acute respiratory infection	165222	3.3
Neuroses	127254	2.6
Observations	122054	2.5
Chronic Ischemic Heart Disease	118936	2.4
Hay fever	93432	1.9
Otitis media	80814	1.6
Acute pharyngitis	79985	1.6
Obesity	77842	1.6
Refractive errors	70462	1.4
Other eczema	70285	1.4
Diabetes	68381	1.4
Acute tonsillitis	63235	1.3
None	61584	1.2
Diseases of Sebaccous glands	61192	1.2
Other viral diseases	53428	1.1
Bronchitis, unqualified	53083	1.1
All Other	2663334	53.8

Source: Calculations based on National Ambulatory Care Survey Table

Table 2

Expected Number of Deaths per 100,000 from Ages 15 through 24

CAUSE OF DEATH	WHITE MALES	NONWHITE MALES
Motor accidents	807	661
Other accidents	310	545
Suicide	113	82
Neoplasms	103	82
Homicide	75	771
Influenza and pneumonia	29	58
Heart diseases	28	69
All causes	1,690	2,777

Table 3

Expected Number of Deaths per 100,000
from Ages 35 through 44

CAUSE OF DEATH		
Heart diseases	999	1,831
Neoplasms	507	803
(lung cancer)	(146)	(285)
Motor accidents	351	596
Other accidents	321	787
Suicide	232	126
Cirrhosis of liver	188	557
Homicide	98	1,146
Influenza and pneumonia	79	422
All causes	3,458	9,203

Table 4

Expected Number of Deaths per 100,000 from Ages 55 through 64

CAUSE OF DEATH	WHITE MALES	NONWHITE MALES
Heart diseases	9,940	11,679
Neoplasms	4,697	6,484
(lung cancer)	(1,848)	(2,148)
Cerebrovascular disease	1,196	3,519
Cirrhosis of liver	645	677
Other accidents	508	945
Influenza and pneumonia	505	1,210
Motor Accidents	383	628
Suicide	348	120
Homicide	62	508
All causes	21,902	32,607

Table 5

Examples of The "New Morbidity"

1. Drugs

   (a) alcohol addiction: leading to cirrhosis of the liver, encephalopathy and malnutrition.
   (b) social excess of alcohol: leading to motor accidents and obesity.
   (c) cigarette smoking causing chronic bronchitis, emphysema and cancer of the lung, and aggravating coronary artery disease,
   (d) abuse of pharmaceuticals: leading to suicide, monicide, malnutrition and accidents.
   (f) social use of psychotropic drugs: leading to social withdrawal and acute anxiety attacks.

2. Diet and Exercise

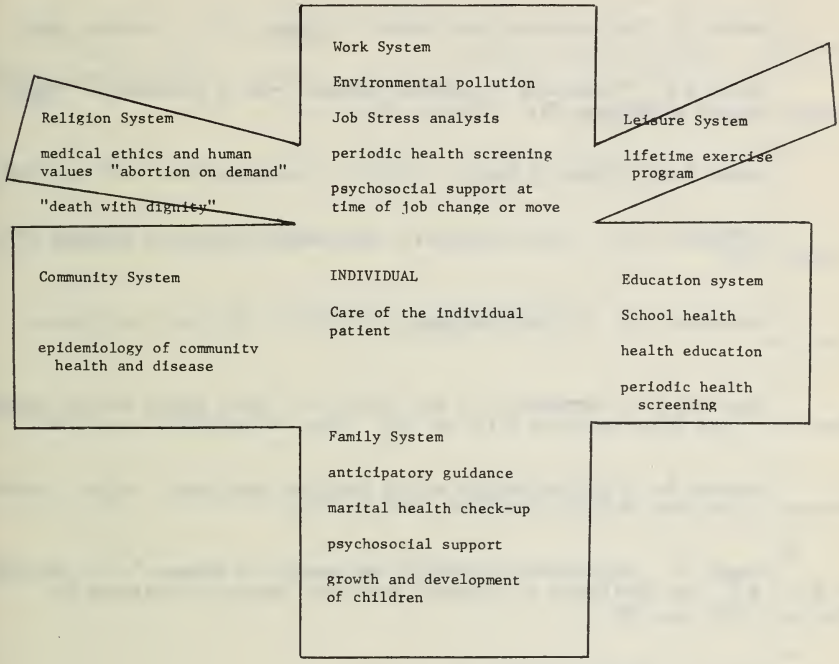
   (a) over-eating: leading to obesity and its consequences.
   (b) high-fat intake: possibly contributing to atherosclerosis and coronary-artery disease.
   (c) high carbohydrate intake: contributing to dental caries.
   (d) fad diets: leading to malnutrition.
   (e) lack of exercise: aggravating coronary-artery disease, leading to obesity and causing lack of physcial fitness.
   (f) malnutrition: leading to numerous health problems.
   (g) lack of recreation and lack of relief from work and other pressures: associated with stress disease such as hypertension, coronary-artery disease and peptic ulcers.

3. Others

   (a) careless driving and failure to wear seat-belts: leading to accidents and resultant deaths and injuries.
   (b) promiscuity and carelessness: leading to syphilis and gonorrhea.

Marc Lalonde. A new perspective on the health of Canadians. Ottawa, Canada. Ministry of National Health and Welfare, 1974.

Figure 1



The Physician and Interface Concerns

Footnotes

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ISSUES IN HEALTH MANPOWER POLICY: AN OVERVIEW

James W. Begun
Michael Durfee

ISSUES IN HEALTH MANPOWER POLICY: AN OVERVIEW

Major involvement of the federal government with health manpower issues began with the Health Professions Education Assistance Act of 1963. At that time funds were authorized on a matching grant basis for schools of medicine, dentistry, osteopathy, public health, optometry, professional nursing, and podiatric medicine; and student loan funds were made available to schools of medicine, dentistry, and osteopathy. Several amendments to this act made its coverage more extensive. The problems of health manpower shortage and maldistribution were more directly addressed in the 1966 Allied Health Professions Personnel Training Act, the 1968 Health Manpower Act, the 1971 Comprehensive Health Manpower Training Act, and subsequent legislation. The 1971 Act introduced the concept of capitation--providing schools with fixed amounts of money per matriculated student. Currently the federal government finances approximately 50% of the total cost of health manpower education.[1] For this reason, federal interest in health manpower supply and distribution continues to be strong today. This interest has been further stimulated by fears that national health insurance will put even greater pressure than already exists on the available supply of health personnel.

Presented below is a summary of major issues in health manpower policy. The issue of health manpower quality, although an important one, is subsidiary to the issues presented here and is not discussed. Mainly, policies affecting physician manpower are discussed here as illustrations of the issues. This is not to deny the importance of policies affecting other types of personnel, but rather to limit the extent of the discussion.

A further limitation of this paper is that we do not fully debate the relative contribution of health manpower to the achievement of health status. This discussion is restricted mainly to issues "internal" to

health manpower policy--it does not compare alternative approaches to improving health.

Much of this paper is devoted to projections of health manpower supply and distribution in the future, to the years 1990 or 2000. This long-term perspective is vital to planning in an area as complex as the health care system. Many health manpower policies, such as changing the supply of physicians, take years to implement and to impact on the population. Projections of manpower supplies through 1990 are presented, along with some "guestimates" of geographic and specialty distribution. It is argued that total supplies should not be allowed to increase as much as projected, and that expectations for changing the specialty and geographic distribution should be lowered.

The discussion then shifts to the concept of "manpower modifiers," factors which will alter requirements for the types of personnel currently being produced. Such factors must be closely monitored in the future so that appropriate changes in health manpower policy can be made. Currently, health manpower policy often seems to be formulated in a "vacuum", as an independent component of the health care system. Examining "manpower modifiers" encourages recognition of health manpower as one of many interdependent and overlapping components of the system. Although the impact of manpower modifiers on health manpower requirements is a matter of speculation, we conclude that the existence of such modifiers does not contradict the basic conclusions of the preceding discussion.

I. The Supply of Health Personnel: How Many Are Enough?

A consistent conclusion of the several critiques of the health care system in the United States undertaken during the 1950s and 1960s was that there was a shortage of most types of health personnel, particularly physicians. As late as 1969, the Assistant Secretary for Health estimated that 50,000 additional physicians beyond the expected supply would be needed by 1980, and this estimate was supported by both the American Medical Association and the Association of American Medical Colleges.[2] In 1970 the Carnegie Commission Report on the Nation's Health concluded that "The most serious shortages of professional personnel in any major occupation group in the United States are in the health services."[3]

The major intention of federal health manpower policy since 1963 has been to remedy this shortage by increasing enrollment in health manpower training programs. Rapid growth in medical school enrollment began in 1968, and from 1968 to 1974 the total number of students enrolled in American medical schools jumped from 35,833 to 53,554, a rate exceeding most projections of the needed supply. The number of medical schools in the country grew from 95 to 114.[4,5] Federal outlays for physician training totalled $407 million in 1974, while federal programs to finance health manpower training of all types totalled about $1.4 billion.[6]

As a result, impressive gains are expected in the numbers of all types of health personnel. Table 1 shows low, moderate, and high projections of physicians and population/physician ratios for 1975-1990 (and actual figures for 1960-1970). Naturally these projections are highly speculative, because they are based on past trends. On the other hand, such projections can provide a rationale for policies which would alter the projected trends.

The projections presented here are taken from a recent study by the Department of Health, Education and Welfare.[7] The "moderate" physician projection makes the following major assumptions: (1) U.S. medical school enrollment from the year 1975-76 to the mid-1980's will increase at the same average yearly rate as that experienced in the 1952-66 period, 1.3% for M.D.s and 0.6% for D.O.s, and (2) the 1970-71 net increase in foreign medical graduates (about 5,200) will continue through the 1980s. The "low" projection assumes that U.S. first-year student enrollment will remain constant at 1974-75 levels and that FMGs will increase at their slower 1963-70 average (about 3,800 net per year). Finally, the "high" alternative is based on U.S. annual enrollment increasing at 2.7% for M.D.s and 1.2% for D.O.s (still lower than the actual 1966-72 rates of increase) and an FMG net increase of a constant 6,600 per year.

Based on all three projections, we can anticipate a substantial reduction in population/physician ratios over the next fifteen years. Such ratios cannot be adjusted for changing demand for services and productivity of personnel, and other problems restrict their usefulness in health policy planning,[8,9] but they do forcefully convey the fact that numbers of physicians are expected to increase at rates much faster than the U.S. population. From a ratio of 634 population per physician in 1970, the country is projected to move to a 415:1 ratio in 1990. The projections presented here were prepared only to the year 1990. If the 1985-1990 trend (percentage increase) were to continue to the year 2000, there would be 777,100 physicians, with a population/physician ratio of 340:1 (using the "moderate" projection).[10]

The projections are based on early 1970s data, but the limited evidence available so far suggests that the projections are fairly accurate.

United States medical school enrollment has continued to increase rapidly. There were about 15,000 first-year U.S. students in 1975-76, 250 more than the "high" projections assumes.[11] On the other hand, the projected FMG increases may be overestimated due to inaccuracies in the original data.[12]

Table 2 presents projected numbers of dentists, pharmacists, optometrists, registered nurses and selected allied health personnel. In Table 3, projected population per worker is shown. These projections are only for the active supply of formally trained persons, not for the total supply of workers. Fastest-growing among the baccalaureate level occupations are medical technologists, speech pathologists and physical therapists. At below the baccalaureate level, occupational therapy assistants, certified laboratory assistants, and dental assistants and technicians will grow fastest.

The number of allied medical personnel per physician grew from 0.64 to 1.65 between 1950 and 1970, and the number of registered nurses per physician rose from 1.71 to 2.16 over the same period.[13] The supply of the allied health professionals in Table 2 will increase three-fold between 1970 to 1990 if the projections are accurate, a rate much greater than that expected for physicians. Thus the trend toward higher ratios of support workers per physician should continue in the future. For example, excluding the dental auxiliaries, the number of allied health personnel in Table 2 per physician would increase from 1.72 to 2.25 between 1970 and 1990.

The total supply of workers in the health care field is much greater than the number of formally trained personnel discussed above. Health workers in the private sector alone totalled about 3.7 million in 1973,

up from 1.5 million in 1960 and 3.1 million in 1970.[14] The 1973 total represents more workers than those employed by the automotive, mining, and electronic industries combined.

We have seen, then, that federal policy (in addition to other factors) has definitely succeeded in increasing the supply of personnel. The expense of this policy has been substantial, however, and it is not clear that increased numbers of personnel are now or ever were "needed." The question of how many personnel are needed is indeed a devilish one, and several approaches to the question have been taken. At one extreme, supply requirements can be based on morbidity and mortality patterns, using expert judgements of the types of services needed to treat disease patterns.[15,16] Such studies for several reasons are bound to show under-supply and maldistribution of resources.[17] Comparison of population/physician ratios with corresponding ratios from prepaid group practices is another approach, this one tending to show oversupply of resources.[18,19] A third approach, and the most typical one, is to compare the population/physician ratio in certain regions with the ratio in other regions, pointing out under- and oversupply relative to the selected standard. Another approach asks professional leaders to estimate supply needs within their specialties.[20] Finally, economists may investigate the supply-demand balance to derive estimates of "need."[21]

It is evident from the different answers given by each approach that there is no easy response to "how many personnel are enough?" For policy purposes, the response of the Ontario Council of Health has much to recommend itself:

> ...until new evidence becomes available, or until such time as there are any major changes in the structure of the provincial medical care system, or in current patterns of medical practice, the physician/population ratio in Ontario [should] be maintained within the range of 1:600-650.[22]

The 1:600-650 recommendation by the Ontario Council was based on the present supply, "relative" public satisfaction with that supply, and the argument that the World Health Organization has recommended the 1:650 ratio as a suitable one.

In addition, the Council states that there are no perceived health benefits of improved physician/population ratios. This argument has been substantiated by research which documents the relative importance of non-medical factors in determining health. Environmental conditions, population size and structure, genetic traits, social disorganization, poverty, and emotional instability have been recognized as important in the etiology of physical disease.[23] Compared to those factors, the influence of physician density on health is relatively small.[24,25,26]

In addition to the cost-benefit and "need" arguments against expansion of the physician supply, another indication of excess capacity is indicated by the following rough calculations. In 1974, the National Health Survey reported 1,025,340,000 physician visits for the non-institutionalized U.S. population.[27] A total of approximately 367,000 active physicians in 1974 supplied those visits.[28] At the same rate, the "moderate" 1990 projected physician supply could provide about 1.7 billion visits. If the physician supply growth continued through 2000, a capability for almost 2.2 billion visits would exist. These estimates are very "soft" because they assume the same physician activity mix and productivity, and the same mix between in- and out-patient physician care. Nevertheless, compared to the 1990 and 2000 estimated population use of 1.2 billion and 1.3 billion visits based on 1971 use rates, some indication of excess supply is suggested.[29]

Economic constraints in the U.S. may force a policy similar to that of the Ontario Council of Health even if such a policy is not consciously

chosen. In addition to the direct costs of subsidizing health manpower training, researchers have pointed out that availability of a greater supply of health manpower will increase demand for more health services (and total costs) regardless of need.[30] Ginzberg, for example, points to "overdoctoring" due to an excess supply of personnel in the cases of hysterectomy, masectomy, and thyroidectomy surgery and in the "indiscriminate" prescribing of antibiotics for upper respiratory infections.[31] The Ontario Council of Health finds that "Each physician receives an average of $70,000 annually in gross income and generates several times that amount in the cost of services prescribed by the physician."[32] The growth in the number of personnel per physician will further stimulate health expenditures in the United States.

In summary, the costs of continued expansion in the quantity of health personnel are substantial in relation to potential benefits. Health expenditures as a percentage of our Gross National Product have risen from 5.9% to 8.3% between 1965 and 1975, and further large expansion of the manpower supply could force health expenditures to intolerable levels. The area of manpower supply is one in which the problem of rising expenditures can be attacked directly, by placing restrictions on supply.

II. The Foreign Medical Graduate: How Many Are Enough?

Since foreign medical graduates now comprise such a significant percentage of new physicians, the supply of FMGs deserves separate attention. In 1972, 46 percent of new physician licentiates in the U.S. were FMGs, compared to 26 percent in 1970, 18 percent in 1960, and 5 percent in 1950.[33] About one-fifth of all physicians in the U.S. in 1973 were foreign-educated, and FMGs filled 31 percent of all house staff positions.[34,35]

Table 4 gives high, moderate, and low projections of FMGs in the U.S. through 1990, based on the assumptions mentioned earlier. The projections range from a doubling to a tripling of the FMG supply in a twenty year period.

Federal interest in the FMG issue has increased in recent years, and restrictions on the inflow of FMGs have been considered. Calculations from Tables 1 and 2 show that if no FMGs were to enter the U.S. after 1980, a population/physician ratio of about 450:1 would still be attained by 1990 (based on the "moderate" projections). Given the indeterminant nature of "need," it is of questionable value for the U.S. to continue to allow large numbers of FMGs to immigrate, particularly from countries with lower numbers of physicians (relative to population). Whether limitation of the inflow should be accomplished by new laws or will occur naturally due to the limited number of available residency positions is subject to debate.[36]

III. The Specialty Distribution of Health Personnel: Whatever Happened to the Family Doctor?

For years, the numerical demise of the family doctor has been lamented by consumers and legislators alike. With the exception of this decline in general practice, there has been little change in physician distribution by specialty over the past decade.[37] Specialty distribution has been projected forward to 1990 in Table 5 based on the distribution of first-year residencies in 1972.

Other projections are available based on the 1972 <u>total</u> residency distribution and extrapolated trends in first-year residencies for selected years 1961-1972.[38] In general these projections resemble the one presented in Table 5. The only major difference is that when trends

in first-year residencies are extended rather than held at 1972 levels, by 1990 family practice (not including general practice) grows to a size of 43,000 or 7.2% of total physicians as opposed to 13,000 or 2.2% of total physicians in Table 5. A continuation of the 1961-1972 growth in family practice residencies, yielding the 43,000 projection, seems highly unlikely.

The Table 5 projection predicts that physicians in general practice will continue to decline, but the decline will be substantially offset by growth in pediatrics, internal medicine, and family practice. The combined percentage of physicians engaged in family practice, general practice, pediatrics, internal medicine, and obstetrics-gynecology would be about 42% in 1990 compared to 44% in 1970.

Deriving the actual need for specialists of each type is an undertaking as imprecise as estimating the total supply of physicians needed. As with the total physician supply, particular specialties are able to expand or limit their work boundaries and total output within a wide range, thus complicating any estimates of specialty distribution "needed." The evidence does suggest, though, that further expansion of subspecialties should be discouraged or limited. For example, excessive training of specialists in the subfields of surgery has been documented by the Study of Surgical Specialties in the United States.[39] Much of the work of internal medicine subspecialties has been shown to be "primary care activity."[40] In the United Kingdom, 8,000 specialists administer to about 50 million persons, compared to 280,000 specialists for about 200 million persons in the United States.[41] Of course the two health care systems differ vastly, but the data do suggest that our health would not suffer by a much lower ratio of specialists to primary care practitioners.

The notion of physician-created demand has implications for the specialty distribution argument, also. If physicians are able to "create" demand for care, why not create demand for cheaper, primary care services rather than specialized and expensive care?

We have seen that without intervention, specialty distribution will probably not change substantially in the future. Continued advances in knowledge and technology may provide pressure for even further specialization. Policies to encourage more primary care training, such as financial support of family practice residencies, are required to deter specialization trends which are unrelated to health care needs.

IV. The Geographic Distribution of Health Personnel: Inner City and Rural Manpower Problems

In general, physicians are distributed like any group of highly mobile white-collar professionals, with major concentration in urban areas. Population/physician ratios decrease as urbanization decreases (see Table 6) and as a result highly urbanized states, such as New York and Massachusetts, and highly urbanized regions, such as the Pacific and New England, have the highest ratios of physicians to population.[42] These comparisons fail to reveal the extreme inequity of physician distribution within urban areas--poor inner city ghettos are underserved in the same sense that rural areas are.

Projections of urban-rural physician distribution are not available, but we argue below that there is no reason to expect distribution patterns to change significantly in the future. Nonetheless, an implicit assumption of efforts to increase the supply of personnel has been that increased numbers will "spill-over" into shortage areas and solve the maldistribution problem.

Direct measurement of the effects of increased enrollment on geographic distribution cannot be made for several years, but signs are not encouraging that increased enrollment will have a substantial influence on maldistribution. Between 12/31/66 and 12/31/73 the population/physician ratio in urban areas decreased from 613:1 to 544:1, about 11%, compared to a decrease of 1270:1 to 1153:1 for rural areas, about 9%.[43,44] Thus relative differences remained about the same. Although a vastly increased supply of physicians might eventually result in relatively more physicians in rural areas, the effect would have to be achieved at tremendous cost and a long time delay--the United States would have to educate enough physicians so that a substantial number were unable to make a living by practicing in areas where physicians are in ample supply. The total supply increase necessary to do so is probably an unattainable number. In addition, it is probable that it will take more than a reduction in income to move large numbers of physicians to rural communities. Limited specialists, particularly, could not be expected to go to communities where their skills would not be put to use.

A voluminous amount of literature exists on the determinants of physicians' geographic location.[45,46] Such literature identifies factors which determine (either statistically or causally) physician location patterns. Often these factors are thought to be "manipulable" by some policy. As a result, policies to redistribute physicians have been proposed or implemented. The Area Health Education Centers Program of 1972 attempts to upgrade the "professional environment" of physicians in shortage areas, for instances.

One policy suggestion to influence geographic location of physicians has been to recruit more medical students from rural, lower income

backgrounds, since currently only a very small proportion of physicians originate from those settings. Such a program would be difficult to implement and its effects would be limited by current distributional patterns. Research has shown that the most urbanized and most rural counties get fewer physicians than they produce, with counties between the extremes getting the highest percentage of physicians they produce. In more urban and wealthier counties, smaller communities are more attractive.[47] This reflects a process of suburbanization in location selection. The impact of this policy suggestion would be further limited by the fact that only a small proportion of students choose to practice general or family medicine.

Another policy which has received attention is the location of more training institutions in areas with physician shortages. However, the same factors which make a community attractive for physicians to practice are also necessary for physician training institutions. In this way, community characteristics will limit the success of changing the location of training programs in order to redistribute the medical manpower, just as they limit the current distribution of physicians. Any program aimed at changing distributional patterns which centers on one or even several "manipulable" variables will be constrained by community social and demographic characteristics. These community constraints have in the past limited the effectiveness of such programs as the Hill-Burton hospital construction program and the Regional Medical Program. The Hill-Burton program overcame inequities between communities in hospital beds; however, this did not lead to greater equity in the distribution of physicians.[48] In the RMP, distribution of resources was patterned on the already-existing uneven distribution of physician manpower and community resources.[49]

A more controversial approach, the National Health Service Corps, provides student loans in exchange for service in rural areas. Recent

proposals would increase the scope of the NHSC concept by establishing a domestic "health professions draft" which would require two years service by students "drafted" from schools which receive federal capitation payments.[50]

This proposal helps to illuminate an underlying value conflict in the redistribution controversy. The conflict is between two highly prized values--equity and freedom. The freedom of physicians to locate their practices as they choose is opposed to an equitable distribution of physicians. How much inequity justifies restrictions on physicians' location? The answer must always be a valuative rather than an empirical one.

Because such value conflicts as the above will be resolved in the political system by compromise, we can expect that the "pluralistic program" approach to the maldistribution problem will continue. Remote-site training, the National Health Service Corps, and physician extender programs (discussed below) can all contribute to improvement in selective problem areas. This pluralistic approach may be valuable in that maldistribution determinants vary by geographic region--programs appropriate for the inner city, for example, may not be successful in rural areas.

We should realize, however, that the pluralistic, piecemeal approach is unlikely to result in large changes in geographic distribution patterns. The geographic location choice by physicians is in large part determined by the socioeconomic and demographic characteristics of communities that make these communities more or less attractive to physicians. Working within these constraints, there is no one simple answer to the distribution problem. Regional resources can be better utilized, referral patterns strengthened, and part-time services and satellite clinics for isolated areas established. Such programs <u>can</u> have vital impact on the most severe

problem areas although the overall scene will not be substantially changed. The major point of this discussion is that we should maintain realistic expectations regarding the impact of these programs.

V. Physician Extenders: We Can Do It Cheaper

In response to three of the issues raised above--total supply and specialty and geographic distribution--new categories of personnel have been developed to perform some of the primary care duties of physicians and other professionals. For example, an estimated 1,000 students graduated from various physician extender programs in fiscal year 1974. These students include family nurse practitioners, physician assistants, physician associates, community health medics, medex, child health associates, and pediatric nurse practitioners.[51] Such programs are too new to anticipate their effect on the supply and distribution of medical care providers, but preliminary indications are encouraging. For instance, for a defined set of services, care by nurse practitioners has been equal to care by physicians as measured by patient health status and satisfaction.[52] Family nurse practitioners in rural North Carolina managed 70% of all pediatric cases using standing orders, and review of medical records by physicians indicated that 93% of the cases were managed properly by the FNPs.[53]

Some programs have also noted success in redistributing resources to rural areas. Medex graduates, for instance, are primarily employed by rural family physicians.[54] To the extent that physician extenders are dependent on physician control or back-up, though, their influence on the overall distribution of resources will be slight.

A recent evaluation of dental manpower subsidy programs concluded that an alternative program--subsidizing dental auxiliaries--could produce

an equivalent increase in dental visits at less than one tenth the cost of the dental subsidy programs.[55] For this reason alone, primary care extender programs should receive priority over expansion of the traditional types of personnel.

New Health Care Workers

It is but a small leap from the recognition of physician extenders to the development of other types of health workers. The emerging trend toward demystification of the physician's role may help to support collaboration among health professionals, but more importantly may be responsible for giving back to the patient decision-making capabilities.[56] To help the consumer exercise this potential, a variety of innovative programs are being developed. It is conceivable that these programs might eventually reduce both professional manpower requirements and total health care costs. At the very least they will diminish the total dependency of the consumer on the health professional. As Victor Fuchs has noted "...frequently the only way a person can know whether he needs to see a physician is to see a physician."[57]

One criticism of the further development of "physician extenders" is that health care costs will rise as other groups of specially trained and licensed health care workers enter the medical hierarchy. There exists, however, a model of unpaid, unlicensed health care workers with strictly advisory skills. Developed by Dr. Eva Salber, Duke University Medical Center, the "health facilitator" is a person identified by community members as having interest in and knowledge about health matters. This person is typically consulted about health and illness questions by the neighborhood, housing project, or larger community. After a twelve week training program the health facilitator is then able not only to improve

upon the health advice he dispenses, but also to facilitate the entry of community members into the health care system when the need arises.[58,59] Another example of a "medical center extender" is the "community health worker ," a new health occupational role which dates back to the Office of Economic Opportunity-sponsored projects. This salaried health worker serves to interpret the medical center to the community and to function as an advocate for the patient in his encounters with the health facility.

I.B. Pless and his co-workers at Rochester have trained non-professional women to serve as psychosocial support groups for children with chronic disease. After a brief training program consisting of the fundamentals of chronic disease care and listening and counseling techniques, they have gone into homes and supplied the caring function often missing in the medical care of patients with chronic disease.[60]

The Patient as Physician

Health facilitators, community health workers and health advocates together with other "physician extenders" on the horizon will help to educate the patient about health needs and will facilitate his access into the health care system. Eventually, however, the responsibility for health maintenance must be borne by the patient himself. One of the first steps toward both health education and health system awareness is giving the patient responsibility for maintaining his own medical record.[61] Improved health education by the physician and better compliance by the patient would be the expected result of giving a copy of the medical record to the patient.

The "para-medic" concept has been professionalized in today's medical care system, but this neglects the evolution of the "activated patient" becoming his own "para-medic." Starting with an admittedly well-educated

group from a small community, Sehnert taught the fundamentals of emergency care, common illnesses and their treatment, basic nutrition, as well as home care procedures. He taught this group of laymen to use an otoscope, sphygmomanometer, and a stethoscope. Clinical algorithms (decision trees) taught the patient to diagnose the problems of himself and his family.[62] Other examples of returning responsibility for health education from institutionalized settings to the individual patient and his family include Schaefer's "parents as educators" and "mothers as behavior therapists."[63,64] Each of these examples illustrates the potential of returning to the patient pieces of decision-making regarding health maintenance and illness care heretofore guarded by the medical profession. It re-emphasizes the role of the patient as the most important (and least costly) member of the health care team. The "patient as para-medic" concept converts the patient to an active participant in his own care. It is consistent with the trend toward demystification of the physician's role and with the change in the focus from illness care to concern for modification of lifestyle abberations. Anne Sommers views health education as the only major hope in health care cost containment.[65]

The expansion of primary care extender programs could substantially revise any rough projections of future requirements for physicians, dentists, and other professionals, probably downward. For this reason, the primary care extender programs could be termed "manpower modifiers." Several other factors which could alter the requirements for personnel as they are now trained are discussed in the next section.

VI. Other Manpower Modifiers

Numerous other factors could be termed "manpower modifiers" in the sense that they are important determinants of future manpower requirements.

Population size and composition, for example, could alter health manpower requirements. The declining birth rate has led to the recommendation by some that the number of pediatricians in training be lowered,[66] while the expected increase in the over 65 population has stimulated interest in gerontology. Legal restrictions continue to hamper the development of expanded duty primary care extenders, and changes in health manpower laws will also impact on the capacity to produce particular types of personnel. New technologies could either decrease or increase manpower needs. In the past, many technological developments, such as renal dialysis and open heart surgery, have resulted in increased manpower needs.

This paper does not attempt to speculate on the absolute effects of each of these factors on health manpower needs, only to acknowledge their importance. We do argue, though, that "manpower modifiers" are probably as likely to decrease total manpower needs as to increase them, and therefore do not contradict the earlier assertion that professional manpower supply growth should be restricted. The offsetting nature of manpower modifiers is illustrated by the two final factors we examine--organization and financing.

Organization

As the current organizational innovations in health services are surveyed, several questions arise in relation to health manpower: 1) Can physician (and other professional) productivity be increased, thereby decreasing manpower requirements? 2) Will increased demand offset potential increases in productivity? 3) What existing facilities and manpower can be better organized in the provision of health care?

Organizational innovations in the medical care system, if successful, will have to address three major consumer concerns: access, cost, and

caring. Newer methods of delivering health care will need to recognize the concept that a continuum of services should be provided for a continuum of needs. Ideally patient needs, physical and emotional, acute and chronic, will be matched with appropriate health care personnel and technology.

Experience with the Kaiser-Permanente group's ambulatory care restructuring shows that these organizational goals can be met. Over two-thirds of their patients fell into the category of "well," "worried well," and "symptomatic sick." Less than one third were classified as "sick." Consequently, they have organized their outpatient staffing to route patients into either a health care service, preventive maintenance service, or a sick care service. The bulk of patients will receive care by mid-level practitioners in one of the first two services. They found that one physician could supervise nine nurse practitioners in these two care areas. In the sick care service, physicians took care of the remaining group (less than one third of the total) of patients with acute or chronic medical problems.[67]

Flexibility in allocation of personnel, time, and equipment provided by this three-tiered system increased access into the medical care system by decreasing waiting time for appointments. It was shown to be cost effective and to increase the productivity of physicians. Patients were satisfied with the care received.

Anne Somers has reported that the Kaiser-Permanente medical groups in northern California are adequately staffed with 50 primary physicians/ 100,000 population versus a recommended 133/100,000.[68] The ratio of primary care physicians to other specialists is 1:1. If the Kaiser-Permanente experience was reproduced in other Health Maintenance Organization settings on a national scale, we might anticipate greater physician

productivity, an insufficient supply of primary care physicians, and an oversupply of other specialists.[69,70]

Health Maintenance Organizations and other experiments with pre-paid group health care represent the major innovative efforts in the general medical care field. Smaller scale innovations in other areas such as the day-surgery centers both inside and outside the hospital offer promise of manpower, facility, and cost economy. Approximately 20% of the nation's 7,000 hospitals now have programs which allow relatively minor surgical procedures to be performed the same day the patient is admitted to the facility. Discharge from the facility is accomplished after an appropriate recovery period on the same day.

Another innovative method of conserving both manpower and physical facilities is the utilization of already existing programs which can be adapted to health related activities. Utilizing the Maryland Extension Service, the Maryland Consumer Health Education Demonstration Project identified the health needs of a community pediatric clinic's teenage population. It then developed an extensive health education program for the adolescents and their parents.[71] Schools might well be adapted to function not only as educational institutions but as community health centers, mental health centers, and pre-school health, screening, and counseling centers.[72,73]

Although it is too early to judge the effect of the Health Systems Agencies (PL 93-641) on manpower requirements, the intent of the legislation was to encourage HSA's to undertake need assessments and to plan manpower and hospital bed requirements based upon these studies.

It is apparent that organizational changes in health services can increase physician productivity and reduce manpower requirements. Stimulation

of pre-paid group practice and more efficient use of existing facilities offer promising potential in the reduction of manpower requirements.

Financing: National Health Insurance

It is expected that passage of a national health insurance measure will increase utilization of health care facilities, particularly out-patient medical services. (Most of the pouplation already has extensive in-hospital insurance coverage.) The literature on this subject is inconclusive, though. Newhouse et. al.foresee huge increases (30-75%) in ambulatory care demand and in dental and pharmacy services (up to 100%).[74] A national plan is not likely to be as comprehensive as originally anticipated, though, so estimates by the U.S. Department of Health, Education and Welfare seem more reasonable.[75] They predict that utilization of pharmacy services should increase only a small amount, because except for low income persons price elasticity for pharmacy services is very low. Similarly, changes in the utilization of dental services are expected to be relatively small, since benefits will probably be limited to children. The Department estimates that most manpower needs will be met even if national health insurance is implemented. The physician supply will not be "sufficient" until 1980-81, however, and a shortage of mental health manpower is anticipated. In general, it appears that there is no cause for alarm over any "crisis" in health manpower supply due to national health insurance.

Because physicians avoid underserved, rural areas largely for nonfinancial reasons, we can expect that national health insurance will have little impact on the geographic distribution of physicians. If anything, rural scarcity areas may be worse off if demand accelerates faster than supply. Physicians' specialty choices will not be likely

to change either, because national health insurance will not alter the many non-financial factors affecting choice of specialty. Thus the problems of geographic maldistribution and overspecialized care will remain. National health insurance can have limited impact on these two problems by providing adequate reimbursement for services of family nurse practitioners and other non-physician primary care providers, and relatively higher reimbursements for primary care services provided in rural areas.

These brief examples of how technology, new personnel, demography, laws, organization, and financing can affect health manpower policy emphasize the interrelatedness of the components of the health care system and of the health care system with the rest of society. Manpower policy must be planned in coordination with these other factors.

VII. Conclusions

Above we have examined six major issues facing health manpower policy-makers today and in the future. The total supply of health professionals, we argued, may be in excess of any reasonable estimate of requirements, resulting in severe economic consequences for the health care system. This excess is particularly acute (and expensive) among specialists. Geographic distribution problems do exist and will continue to exist in the foreseeable future. Primary care extender programs offer a promising response to the issues of supply and distribution, but there are constraints on the extent of their impact. Several other factors, termed "manpower modifiers," will affect and possibly decrease requirements for health professionals as they are currently trained.

General directions for health manpower policy suggested by this discussion are as follows:

1) Limit growth in the supply of health professionals, particularly specialists.

2) Limit the supply of foreign medical graduates.

3) Expand the supply of primary care extender personnel, particularly in the more autonomous occupations, as growth in the more professional occupations is curtailed.

4) Lower expectations that geographic distribution problems will be alleviated by the current pluralistic program approach.

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TABLE 1

Supply of Active Physicians (M.D. and D.O.) and Physician/Population Ratios: Actual 1960 and 1970; Projected 1975-1990

	1960	1970	1975	1980	1985	1990
Low	251,900	323,200	371,900	433,600	494,100	552,000
Moderate	251,900	323,200	377,500	446,800	519,100	595,800
High	251,900	323,200	383,100	459,900	544,300	637,100
			Population per Physician			
Low	717	634	575	517	477	447
Moderate	717	634	567	502	454	415
High	717	634	558	487	433	387

Source: U.S. Department of Health, Education and Welfare : The Supply of Health Manpower, DHEW Publication No. (HRA 75-38, December 1974, page 54 (see pp. 25-55 for assumptions). Ratios calculated using 1960 population of 180,671,000 from U.S. Bureau of the Census : Statistical Abstract of the United States, 1974, Washington, D.C., 1974, page 5; 1970 population of 204,879,000 and 1975-1990 Series E projections from U.S. Bureau of the Census : Population of the United States, Trends and Prospects: 1950-1990, Series P-23, No. 49, Washington, D.C., 1974, page 175.

TABLE 2

Supply of Active Selected Health Personnel: Actual 1970, Projected 1980 - 1990

Occupation	1970	1980	1990
	Educational Preparation at Least Baccalaureate		
Dentists	102,220	126,170	154,910
Optometrists	18,400	21,800	28,000
Pharmacists	129,300	146,100	179,900
Registered Nurses	723,000	1,099,600	1,466,700
Dieticians	15,300	18,170	22,340
Medical Records Administrators	4,200	5,140	6,430
Medical Technologists	45,000	80,620	123,520
Occupational Therapists	7,300	11,760	16,880
Physical Therapists	11,550	23,030	36,570
Speech Pathologists and Audiologists	13,300	37,070	70,930
	Educational Preparation Less than Baccalaureate		
Certified Laboratory Assistants	6,700	22,260	41,160
Cytotechnologists	2,400	4,670	7,400
Dental Assistants	9,200	39,110	71,530
Dental Hygienists	15,100	34,190	57,650
Dental Laboratory Technicians	1,600	7,070	14,290
Licensed Practical Nurses	400,000	565,890	819,790
Medical Records Technicians	3,800	4,900	6,460
Occupational Therapy Assistants	600	4,360	8,820
Radiologic Technologists	41,000	93,560	161,280
Respiratory Therapists	3,850	10,510	18,810

Source: U. S. Department of Health, Education and Welfare : The Supply of Health Manpower, DHEW Publication No. (HRA) 75-38, December 1974, pp. 77-102, 121-151.

TABLE 3

Population Per Active Selected Health Personnel: Actual 1970, Projected 1980 - 1990

Occupation	1970	1980	1990
	Educational Preparation at Least Baccalaureate		
Dentists	2,004	1,776	1,592
Optometrists	11,135	10,281	8,809
Pharmacists	1,585	1,534	1,371
Registered Nurses	283	204	168
Dieticians	13,391	12,335	11,040
Medical Records Administrators	48,781	43,605	38,358
Medical Technologists	4,553	2,780	1,997
Occupational Therapists	28,066	19,059	14,611
Physical Therapists	17,738	9,732	6,744
Speech Pathologists and Audiologists	15,404	6,046	3,477
	Educational Preparation Less Than Baccalaureate		
Certified Laboratory Assistants	30,579	10,069	5,992
Cytotechnologists	85,366	47,994	33,330
Dental Assistants	22,269	5,731	3,448
Dental Hygienists	13,568	6,555	4,278
Dental Laboratory Technicians	128,049	31,702	17,260
Licensed Practical Nurses	512	396	301
Medical Records Technicians	53,916	45,741	38,179
Occupational Therapy Assistants	341,465	51,406	27,964
Radiologic Technologists	4,997	2,396	1,529
Respiratory Therapists	53,215	21,326	13,112

Source: U. S. Department of Health, Education and Welfare: The Supply of Health Manpower, DHEW Publication No. (HRA) 75-38, December 1974, pp. 77-102, 121-151. Ratios are based upon 1970 population of 204,879,000; 1980 projection of 224,132,000; and 1990 projection of 246,639,000 from U. S. Bureau of the Census: Population of the United States, Trends and Prospects: 1950-1990, Series P-23, No. 49, Washington, D.C., 1974, page 175.

TABLE 4

Supply of Active Foreign Trained Physicians (including Canadian): Actual 1970; Projected 1975-1990

	1970	1975	1980	1985	1990
Low	60,000	80,000	99,000	118,000	137,000
Moderate	60,000	86,000	112,000	138,000	164,000
High	60,000	92,000	125,000	158,000	191,000

Source: U.S. Department of Health, Education and Welfare: The Supply of Health Manpower, DHEW Publication No. (HRA) 75-38, December 1974, page 53 (see pp. 25-55 for assumptions).

TABLE 5

Percentage Distribution of Active Physicians (M.D. only) by Specialty: Actual 1970, Projected 1980 - 1990

	1970	1980	1990
Total Active Physicians	100.0 (311,210)	100.0 (430,240)	100.0 (571,030)
General Practice	18.1	11.0	6.4
Medical Specialties	21.3	27.0	30.6
Dermatology	1.3	1.3	1.3
Family Practice	0.5	1.5	2.2
Internal Medicine	13.5	16.7	18.7
Pediatrics	6.0	7.5	8.4
Surgical Specialties	27.4	30.0	31.7
General Surgery	9.6	12.2	13.8
Neurological Surgery	0.8	0.8	0.8
Obstetrics and Gynecology	6.1	6.1	6.1
Ophthalmology	3.2	3.0	2.9
Orthopedic Surgery	3.1	3.1	3.2
Otolaryngology	1.7	1.6	1.5
Plastic Surgery	0.5	0.7	0.8
Thoracic Surgery	0.6	0.7	0.8
Urology	1.9	1.9	1.9
Other Specialties	33.2	32.1	31.3
Anesthesiology	3.5	4.0	4.3
Child Psychiatry	0.7	1.0	1.2
Neurology	1.0	1.5	1.9
Psychiatry	6.8	7.6	8.2
Pathology	3.3	3.9	4.2
Physical Medicine	0.5	0.6	0.7
Radiology	3.4	3.4	3.5
Therapeutic Radiology	0.3	0.4	0.5
Miscellaneous	13.8	9.6	7.0

Source: U. S. Department of Health, Education and Welfare: The Supply of Health Manpower, DHEW Publication No. (HRA) 75-38, December 1974, page 75 (see pp. 57-76 for assumptions). 1980-2000 total number of active physicians varies from Table 1 because D. O.s are excluded and because this projection is based on more current data.

TABLE 6

Non-federal Physicians (M.D. only) by Demographic County Classification, 12/31/73

Demographic County Classification	Physicians	Population 12/31/72	Population per Physician
Counties in SMSAs of 5,000,000+ Population	58,178	24,033,800	413
Counties in SMSAs of 1,000,000 - 4,999,999 Population	124,897	62,728,300	502
Counties in SMSAs with 500,000 - 999,999 Population	45,212	27,691,000	612
Counties in SMSAs with 50,000 - 499,999 Population	56,482	38,944,000	689
Counties Considered Potential SMSAs	4,501	4,209,700	935
Non-metro Counties of 50,000+ Population	17,621	16,057,300	911
Non-metro Counties of 25,000 - 49,999 Population	13,229	15,997,990	1209
Non-metro Counties of 10,000 - 24,999 Population	8,718	15,133,600	1736
Non-metro Counties of 0 - 9,999 Population	2,232	4,652,600	2084
U. S. TOTALS	331,070	209,448,200	633

Source: G. A. Roback : Distribution of Physicians in the U. S., 1973, Chicago, American Medical Association, 1974. Calculated from p. 14.

FOOTNOTES

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MEDICAL CARE FACILITIES

David Metz

The days when the hospital served the destitute, weary traveler and those with diseases regarded as hopeless are over. Today, the hospital is the scientific and technological hub of the medical care system and in 1974 accounted for the largest single portion ($40.9 billion or 39 per cent) of the dollars spent on health care.[1] Of the $104 billion spent on health care in 1974, $41.3 billion or approximately 39.6 per cent was from public funds.[2] Hospital expenditures accounted for 71 per cent of government payments under the Medicare program ... and 37 per cent under Medicaid. Fifty eight (58%) per cent of all public outlays for health services financed hospital care.[3]

In 1973 there were approximately 904,000 non-federal general care hospital beds in the United States or an average of 4.3 beds per 1000 civilian population. This represents a substantial increase from the 474,000 hospital beds in 1946 when the bed to population ratio was 3.4 per 1000.[4] Though the distribution of these beds varies from state to state between 6.5 per 1000 population in North Dakota and 2.1 per 1000 in Alaska, there are only 576 counties in the country without a general hospital.[5,6] "States such as Mississippi, Alabama, Arkansas, Georgia, and Tennessee, which had the lowest bed/population ratio in 1948 now are at the national average or above it. Some of the states with particularly high bed/population ratios in 1948 have actually experienced a decrease. Within states there is also evidence of an improved balance in hospital facilities between the less affluent and more affluent areas."[7]

Since 1958 nearly $12 billion has been spent nationally on hospital construction and modernization of which approximately $3.6 billion came from the federal government.[8] Despite a shifting emphasis in recent years from construction and expansion to modernization of existing facilities

current expenditures are approximately $4 billion annually and will probably reach $5 billion by 1980.

While every community is concerned that the number of beds available is sufficient to accommodate the number of patients requiring hospitalization at any given time, no accurate definitive criteria for determining the exact number of beds a community might need has been developed.

On one hand it is not possible to plan for or build sufficient beds to accommodate the requirements in the event of epidemics, fires, floods, accidents or other catastrophies, let alone the possibility that 100% of the 1.4 million people in the United States over the age of 85 could legitimately require admission to a general care hospital on a given day.[9] On this basis there could never be enough beds.

On the other hand, if a community is to have the capacity to avoid turning a patient away based on a realistic statistical probability, and not attempt to accommodate the extreme, some beds will obviously have to be idle most of the year. In actuality, this is the situation nationally wherein the number of beds available is not filled to capacity.

In 1973 for example, the average occupancy for short-term community hospitals was 75.4 percent.[10] For hospitals with fewer than 100 beds, the average occupancy rate was 64 percent.[11] Over the fourteen year period 1960-1973, annual occupancy has ranged from a high of 78.8 percent in 1969 to a low of 73.4 percent in 1961. Occupancy rates nationally rose steadily between 1960 and 1969 accompanying the increase in health insurance coverage, declined from 1970-1973 and showed a nominal (.27%) increase in 1973.[12] Some examples of the actual and projected excess bed capacity regionally are as follows:

1. Central Oklahoma

1975 bed need	3212
1974 bed supply	3918
1975 minimum surplus	706

2. Dade County, Florida

a)

1975 bed need	7724
1975 bed supply	10670
1975 bed surplus	2946

b)

Year	Beds in Operation	Average Daily Census	Occupancy Rate
1972	7241	5166	71.3%
1975	10670	6179	57.9%
1980	11295	7571	67.0%

3. Minneapolis - St. Paul, Minnesota

1980 bed need	7472
1973 bed supply & new construction	8240
1980 minimum surplus	768

4. Seattle, Washington

1975 bed need	3951
1975 bed supply	4901
1975 surplus	950

5. Sacramento, California

Total beds	3300
Occupancy	60%
Excess beds	1360
Short term beds under construction	506
Projected excess	1500

Based upon 897,830 beds nationally in 1973, Interstudy estimated the average annual cost of carrying an unused bed at $18,250. The net annual cost of carrying our national unused bed capacity was estimated as high as $1.5 billion.[14] Translated to the projected 1500 excess bed capacity for Sacramento, California as an example, this represents a $27,375,000 annual unnecessary cost to that community.

"The occupancy rate at which hospitals operate is an important determinant in the total cost of medical services. Low occupancy is expressed in higher average costs per patient day and as an unwarranted use of [limited]

capital resources. This implies that the average occupancy rate should be as high as possible realizing that fluctuation in demand necessitates an average rate of less than 100%, as does variability in length of stay." [15]

Just what constitutes an appropriate average occupancy rate in terms of (1) efficient operation and (2) meeting the demands for hospital admission has been the subject of considerable study and debate for some time. Though traditional thinking has been that an (average) occupancy rate of 80% represents the maximum level at which a hospital can operate efficiently and that when this level is reached additional beds must be planned, there is considerable evidence that this rate can vary from between 80 percent for hospitals with 100 beds or less and 90 percent for hospitals with 500 or more beds.[16,17] According to Weissman "about 8 percent of the general hospitals do, in fact, actually operate at an average occupancy of 90 percent or more and ... many hospitals operate their medical surgical services at considerably above the 80 percent rate, especially in the high demand months of January, February and March". Current thinking, therefore, seems to conclude that an 80 percent average occupancy rate is too low and that "higher occupancies can be readily achieved by a reduction in bed complement relative to demand and by controlling the daily fluctuations in census."[18]

In addition to the inefficient and unnecessary expenditure of capital resources attributable to excess bed capacity, our national experience has shown that this surplus of facilities has not brought costs down. On the contrary, when extra facilities, equipment and/or personnel have been added, their utilization has adjusted to the increase in their availability and the fees and charges have risen accordingly. Furthermore, there is no evidence to indicate that there is any relationship between the health status of a population and the use of hospital beds.[19]

Another complication in attempting to determine the number of beds

required in a community is the "chicken vs egg" aspect of the relationships between bed supply and demand.

On one hand there are the thoughts first postulated by Roemer et al that the demand for beds follows their supply.[20,21] Rosenthal et al, on the other hand, believe that the supply of beds follows from their demand.[22] To further complicate the debate, Feldstein, based on a study of hospital utilization in England, reports that there are proportionate changes in demand to supply; that the supply could never satisfy the demand; and that the appropriate supply is whatever is available.[23]

Regardless of which is correct, the number of beds available in any community can always be increased as the need arises and nationally the number of beds available is apparently excessive to the current need.

In addition to this excess bed capacity, there is general agreement that a significant percentage of the occupied beds are filled with patients who could more appropriately and efficiently be treated in other less expensive facilities. It has been estimated by health authorities that 25 percent of the patient population are treated in facilities excessive to their needs.[24]

"An HEW cost effective analysis completed in 1968, projected that a better matching of hospital patient needs with facilities' services would result in 81.7 million short term general hospital days being transferred to alternative health facilities. This would have resulted in savings of about $3 billion in 1970 health systems operating costs."[25]

"The economic importance of patients being provided care in the appropriate facility is evident by comparing costs of constructing and operating the various types of facilities. For example, the cost to construct a general acute hospital bed ranges from $14,000 and $72,000 depending upon size, complexity of service and location; a recent national study showed the average cost per bed was about $50,000. The cost of a nursing home bed has

been estimated to be about $25,000. In 1970 the average expense per patient day was $81 in an acute general hospital, $24 in an extended care facility and even less in a nursing home or patient's home."[26]

In addition to the reductions in hospital patient days that might be achieved by caring for patients in more appropriate facilities, further savings might be realized by the effective application of home care programs. "HEW reported that in 1970 about 5.8 million hospital days, equivalent to about 20,000 beds, could have been saved through effective home care programs and about 17 percent of the acute short-term general hospital patient days could have been handled in various long-term care facilities. This would have saved about 37 million patient days of acute care which we estimated would reduce the need for about 126,000 acute beds."[27] HEW's analysis in 1968 also "concluded that a reduction by one day in lengths of stay save 28 million short-term hospital days or the equivalent of about 96,000 beds."[28] Further reductions in the need for acute general care beds have been projected to result from the more extensive use of ambulatory care programs and specifically for ambulatory surgery. The Comptroller General has concurred with estimates that approximately 18,000 general care hospital beds could be eliminated by the more extensive use of ambulatory surgical procedures.[29]

Summarizing the potential financial impact from (1) reducing our national excess bed capacity; (2) caring for patients in more appropriate facilities; (3) reducing the length of stay in short-term general hospitals by more effective utilization review and (4) more extensive use of ambulatory care programs, particularly surgery, it is possible to project annual savings of approximately $6.5 billion in health care operating costs.

Even if we assume that the preceding data and estimates have some deficiencies and do not completely or entirely accurately describe the circumstances, it appears evident that the implications for our limited resources

both nationally and at the community level cannot be ignored when proposals for hospital construction and modernization are considered. A primary concern, therefore, is not just the initial capital outlays for construction, but rather the total operating and maintenance cost over the life time of the facility, which has been estimated to be between $350,000 and $400,000 per year for each $1 million in new construction,[30] the additional costs associated with utilization, and the costs attributable to excess capacity.

In attempting to deal with these and other problems including the contribution that federal funding for health care has made to the inflationary increases in the cost of health care, the United States Congress passed the National Health Planning and Resources Development Act (Public Law 93-641) on January 4, 1975. Specifically, the Act acknowledges that "the many and increasing responses to these problems by the public sector (federal, state and local) and the private sector have not resulted in a comprehensive, rational approach to the present -

a) Lack of uniformly effective methods of delivering health care;

b) Maldistribution of health care facilities and manpower; and

c) Increasing cost of health care."[31]

"Increases in the cost of health care, particularly of hospital stays, have been uncontrollable and inflationary, and there are presently inadequate incentives for the use of appropriate alternative levels of health care, and for the substitution of ambulatory and intermediate care for inpatient hospital care."[32]

If indeed the public interest is to be served, and the American people are to be ensured the availability and accessibility of high quality medical care at a cost we can afford, it appears obvious that further building of general care hospital beds, in the absence of (1) a thorough needs assessment, (2) an evaluation of existing facilities and services,

(3) the development of an integrated and coordinated area-wide plan and (4) the development of funding of appropriate and alternative facilities, can only perpetuate, if not in fact exacerbate the existing intolerable situation.

While the passage of Public Law 93-641 is a long step removed from our tradition of laissez faire, it is nonetheless patterned after previous attempts which relied on self-control and voluntarism, and which have obviously failed. Some of the reasons for this failure have been documented in the Report of the Congress of the United States by the Comptroller General.[33] Others are the opinions of a number of people who have attempted to deal with the situation from a variety of perspectives. A partial listing is as follows:

1. "The controls applied (by local or area wide health planning agencies) have been primarily advisory, with their effects depending upon the willingness of individual institutions to subordinate their ideas of needed facilities and services to those of the planning agencies. Enforcement of these ideas, then, has depended upon the planning agencies' ability to persuade the institutions or financiers of the institutions' projects that their ideas were superior to those of the institutions. Although this method of control achieved some success, lacking sanctions, it was not too effective, causing leading health organizations and authorities to advocate much stronger controls."[34]

2. Attempts to tie government capital grants and interest subsidies, loans from banks and other financial institutions, and third party reimbursement for services, to approvals by local and area-wide planning agencies of capital projects, have not been particularly successful because "the organizations involved were not the only

ones financing health institutions."[35]

3. Because the authority of planning agencies was in many instances limited exclusively to hospitals, they were unable to promote the use of more appropriate facilities.[36]

4. Lack of authority or control was cited as a significant problem of planning agencies in attempting to develop an orderly number and distribution of facilities.[37] Some of the reasons underlining this problem were as follows:

a) "Lack of certificate of need legislation;

b) Inadequate control over health agencies;

c) Inadequate control over proprietary hospitals;

d) Vested interest groups;

e) Planning suggestions which either were not heeded or were not effective;

f) Third party payers do not always support agencies' recommendations;

g) Voluntary agreements bypass agency review;

h) There is difficulty in controlling large, well-established health institutions;

i) There are no regulatory powers;

j) Agencies are dependent upon community cooperation; and

k) The agency does not have authority to determine health facility needs."[38]

5. "The authority of health planning agencies is usually limited to review and comment." Actual decision making lies with other agencies, third party payers, financial institutions and others.[39]

6. There is a lack of data on which to assess needs.[40]

7. Assessment of needs is still largely judgemental, and different agencies, institutions or groups might arrive at different conclusions.

"This creates doubt about the validity of decisions to approve or disapprove proposals to construct facilities or expand services."[41]

"No significant formula has been identified as being the formula for estimating bed needs. In fact, research has shown that there is no way to forecast bed needs."[42] Although the Hill-Burton formula is the most commonly used, "a frequent criticism is that it does not take into account the fact that hospital service areas - medical-surgical, obstetrics and pediatrics ... experience different occupancy rates. If these differences are not taken into account the overall hospital occupancy rate may be distorted."[43]

8. Most agencies do not have adequate personnel or financial resources. One consequence of this is their inability to compete with other public or private agencies or institutions when they are in disagreement.

9. Voluntary boards are often reluctant, assuming they are competent, to accept the authority and responsibility for making difficult decisions. This is particularly true if one considers parochial interests and political, financial and other pressures.

If we are to benefit at all from our past experiences, it becomes evident that any efforts to deal effectively with these problems must, therefore, and foremost in addition to having the full authority of law, provide effective mechanisms for dealing with American ingenuity, resourcefulness, self-reliance, parochialism and political savvy, or be predestined for only marginal effectiveness. While the days of total reliance on voluntarism and self-restraint have long since gone, the pendulum has not completed its swing to total governmental control. The following recommendations are therefore proposed as part of a national policy on medical care facilities construction and are intended to help the voluntary system work. The alternative is more direct federal intervention.

1. A national moratorium should be placed on all new federal financing for construction of acute general care hospital facilities. This should apply to all direct capital financing including grants, loans and interest subsidies, and indirect financing by excluding any costs attributable to such construction from the operating expense reimbursements by any program supported in whole or in part by federal funds.

2. State and regional planning agencies should have adequate and continuous funding to enable them to obtain the professional expertise and data to deal on at least an equal basis with the private institutions. Historically, these agencies have been grossly overmatched and outclassed in all categories by the private sector. In addition, decisions rendered by these agencies should have binding authority on those who control the source of funds.

3. Specific uniform guidelines and criteria for assessing regional needs for health care facilities and resources should be developed by the Federal Government for use by state and regional planning agencies.

4. State and regional agencies should be mandated to develop plans which provide for integrated and progressive health care delivery systems including acute care, chronic and extended care, home care, and ambulatory and emergency care. Facilities could then be designated and licensed regionally to provide a specific level and range of services and to ensure an integrated system, avoid unnecessary duplication of facilities and services, and promote efficiency. Reimbursement from federal funds could be predicated upon this designation and licensure.

5. State and regional agencies should assess existing facilities and services and make recommendations for the elimination, consolidation or conversion of those that are under-utilized, duplicated and inefficient. After allowing a sufficient time to correct the conditions identified, operating support for these facilities and services from any Federal funds

could be withdrawn where appropriate.

6. Financial incentives in the form of grants, loans, subsidies and operating expense reimbursement could be provided for the elimination, consolidation, conversion or modernization of under-utilized, inefficient or obsolete facilities in accordance with the recommendations of the state and regional planning agencies. Inter-institutional cooperation, rather than competition, should be encouraged regionally.

FOOTNOTES

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IMPLICATIONS OF MEDICAL TECHNOLOGY

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From basic research to application, new medical technology provides a myriad of potentially attractive possibilities for the investment of time, energy, and money. It has major implications for health manpower, organization of medical care, and financing, as well as for patient care. In this paper, we will first present several examples of the implications of technology, as general background, then briefly focus on three major examples, which will be presented as illustrations of these implications rather than as exhaustive analyses of the examples in point. We will then discuss some of the methods available for dealing with these issues and finally offer several suggestions for the arduous task of choosing which technologies will receive our investment.

At its beginning, the development of technology requires that capital be invested in research. An investment in research is always a gamble on the unknown. The result of research depends less on the amount of money expended than it does on the hidden working of nature, which it may be impossible to discover, given the available tools of the time. Sometimes, a major breakthrough is simply a matter of serendipity. For example, the potential benefit of penicillin was discovered by an astute observer of an accident, when one of his culture plates was contaminated by fungus from a nearby laboratory.[1]

Once a breakthrough has been made, there is likely to be a rush into similar areas of research. For example, barbital was the first barbituate introduced into clinical medicine. It is an excellent sedative. The slightly different compound, phenobarbital, proved to be an excellent drug for the treatment of epilepsy as well. Further synthesis of similar compounds produced drugs of varying duration of action, useful for briefer sedation than that produced by phenobarbital; but it also resulted in the synthesis of 2500 compounds with no known advantage.[2]

At the point of introduction into clinical medicine, new technology creates ethical problems. Who is to receive the new treatment or test which offers the

hope of improvement and the risk of a serious complication? Once introduced, it remains quite possible for a treatment to become accepted in the absence of conclusive evidence that it is effective. For example, many physicians were treating high blood pressure vigorously before the VA Cooperative Study demonstrated that treated patients who originally had moderately high blood pressure had a reduced number of strokes compared to untreated patients.[3] There were, of course, strong theoretical reasons to suspect that treatment would be effective, but there were similar reasons to suspect that treatment would lower the incidence of heart attack. The same study failed to document evidence to support this suspicion.[4] In another area, over 1.5 million diabetics are currently being treated with pills rather than with insulin. Whether the pills are ultimately beneficial or harmful continues to be a subject of lively debate.[5] In the case of a new diagnostic test, the likelihood of severe complication is usually much less than in the case of a new therapy. Thus, the cost of a marginally useful test is likely to be in dollars paid through third party payers rather than in suffering borne by patients. The tendency is probably even greater, therefore, for marginally useful diagnostic tests to become established than it is for marginally useful therapies.

The pervasive new technology covers a spectrum beginning with new procedures as simple as the shortening of the prescribed period of bedrest following heart attack from weeks or even months to days that has taken place in the last thirty years.[6] Taken by itself, this might have resulted in lower cost because of a decrease in hospital days. At the same time, however, the incidence of heart attack was increasing, and vastly improved techniques of treating and monitoring potentially life-threatening irregularities of the heartbeat resulted in very large capital investment across the nation in coronary care units. This resulted in the new manpower requirement of many specially trained CCU nurses and contributed to a body of special knowledge that increasingly became the province of the internist

or cardiologist rather than the family doctor. Because of the considerable capital required, some hospitals had too little demand to justify the expenditure. This contributed to the stratification of hospitals into secondary and tertiary centers (although by now a relatively small proportion of hospitals are without some form of coronary care unit). When nearby hospitals built similar competing facilities, the need for a regional approach was raised. For the first time in the past thirty years, some of the cost of capital investment was borne by the federal government rather than by the states and municipalities, which had traditionally taken responsibility for capital improvement of hospitals. The cost of the expensive days of care in the coronary care units was increasingly mediated by third party payers rather than paid directly by individuals. This indirectly contributed to pay for the construction of the new facilities. In comparison to the massive expansion of CCU's in the United States, made possible by our abundant resources, it is of note that there has been comparatively little proliferation of such facilities in England, due in part, no doubt, to more limited resources. This restraint enabled the performance of a study published in 1971 which suggests strongly that all heart attack victims do not necessarily fare better in such a specialized unit, finding a group of patients with uncomplicated heart attacks who did at least as well at home as in the hospital.[7] The level of acceptance of CCU care has been so high in the United States that it is likely that such a study would have been considered unethical and could not have been performed here.

The hospital has changed a great deal in the past thirty years. Near the center of the modern hospital is likely to be the laboratory, complete with blood gas machine, coulter counter, autoanalyzer, and spectrophotometer. In the strange world of hospital economics, this is a profit center, the receipts from which go to make up part of the deficit created by the fact that the hospital room rate is probably considerably less than the operating cost to the hospital per bed. Here the magical effect of technology is evident. People willingly pay much more

than the cost to the hospital for a blood lactic dehydrogenase level; but they may rebel if the room rate rises too much above the rate at a local motel. Today's hospital employs 3.1 persons for every bed compared with 1.8 twenty years ago.[8] These personnel earn an average salary three times as much as they did then.[9] Today's patient may be treated by a respiratory therapist, recreational therapist, speech pathologist, music therapist, or psychiatric nurse practitioner. His medicines may be dispensed by a pharmacy technician; his blood analyzed by a laboratory technician; his cells examined by a cytotechnologist; his chart retrieved by a medical records technologist. The number of personnel in many of these areas have burgeoned; many are entirely new types of personnel.

Compared with hospital care, ambulatory care has been less affected by technology. There may be a few more machines around the office, such as an ekg machine or a machine to measure breath flow. Most physicians send a large part of their lab work to an independent laboratory. Office overhead has increased as much because of the emphasis on well kept records and the shift to third party payment because of the concomitant need to have personnel filling out forms and typing dictation as it has because of the new technology.

We have seen that it is possible for a technological innovation to come into widespread use, even when it proves to be of questionable advantage. Our first major example, coronary bypass surgery, illustrates this possibility.[10] Each year, about 150,000 Americans aged 35 to 65 die of coronary artery disease,[11] causing incalculable personal and financial loss. Theoretically, coronary bypass surgery might save many of these lives, if our means of detection could be rendered safe enough and our criteria for surgery accurate and precise enough. Surgery is currently clearly indicated for at least one group of people, those who have chest pain due to coronary disease that does not respond to any other form of treatment. At some risk to life, surgery may relieve them of their pain or prevent

them from having death of the heart tissue which causes their pain because it has an inadequate blood supply. For most groups who might have coronary bypass surgery, however, the benefit is not yet documented. For these groups, it is not clear how many years we may have to wait before the number of active, pain-free years gained due to the surgery will equal the number of such years lost due to operative and post-operative mortality.

Coronary bypass surgery cannot be considered in the absence of coronary arteriography, which is currently the only way of identifying patients likely to profit from surgery with enough certainty and specificity to operate on them. Enthusiasts of diagnostic coronary arteriograms are applying them to a wide spectrum of patients, including those with recurrent heart attacks, atypical chest pain, congestive heart failure, atypical electrocardiograms, and chest pain after exercise testing. Dr. Mason Sones, of the Cleveland Clinic, has suggested that we do 80,000 coronary arteriograms a day in the United States.[12] This works out to screening 1/8 of the population yearly, and at a currently acceptable mortality rate of 0.2% for each arteriogram would result in 50,000 deaths a year from the procedure alone, a figure roughly comparable to the much publicized national highway fatality toll. Even if we had a perfectly safe and accurate method of detecting the 150,000 persons aged 35-65 who will die annually because of coronary artery disease (and there are many more over 65), at $10,000 per operation, the annual expense would be $1.5 billion.

Our second major example, chronic hemodialysis, demonstrates that even when the benefits of a new technology are clear for many patients, the expense can be significant. The National Kidney Disease Foundation has estimated that 50,000 Americans die each year from kidney failure.[13,14] The two definitively effective means of treatment are kidney transplant and hemodialysis, the periodic purification of the blood by means of the artificial kidney. Kidney transplantation is limited by the shortage of available transplant kidneys, deficiencies in our ability

quickly and reliably to match a transplant kidney with a compatible recipient, and by the need to use the transplant kidney within 18 hours. A patient with a transplant kidney in place can lead an almost normal life, as long as he takes the medicine to keep his body from rejecting the transplanted organ, as long as he does not acquire a severe infection, which is a potential complication of taking this medicine, and as long as the transplanted organ is not rejected, which sometimes happens anyway. Half of transplanted kidneys are rejected by three to four years.[15] Patients on hemodialysis, however, must go two or three times a week for a four hour cleansing of their blood through the artificial kidney.

Of the 50,000 patients with kidney failure, most, because of age and concomitant disease, are not suitable candidates for either dialysis or transplantation. Of about 10,000 suitable persons per year, approximately 20% will undergo transplant operations, leaving 8000 patients who will receive hemodialysis alone.[16] These, of course, are 8000 lives maintained. Some of these lives are active and comfortable, in spite of rather rigid dietary and dialysis routines. Others are filled with frequent complications, hospitalizations, and depression. Patients on hemodialysis may be cared for in three general types of setting, at home, in intermediate care facilities, or in hospital based facilities. Hospital dialysis is the most expensive. Costs are quite variable, but $25,000 per year about average. Intermediate care facilities are of two types. Some offer supervised dialysis. They have many of the same personnel as the hospital but do not have the large overhead generated by the use of hospital space. Dialysis in such a setting may cost $12,000 to $15,000 a year. In the other form of intermediate facility, the patient performs his own dialysis. The cost is about $8000 a year. Home dialysis is the least expensive. This form of care requires an initial investment of about $5000 and operating costs approximate $5000 per year.[17]

Currently, one third of patients are cared for at home and two thirds in dialysis centers.[18] Home dialysis requires an intelligent, highly motivated patient.

It is hard to be highly motivated with a chronic disease of the severity of renal failure, and the percentage of such patients is a limiting factor to this form of dialysis. Currently, there is an effort to shift as much care as possible into intermediate settings. Tables I-V contain a projection of the costs of dialysis based on an incidence of 62.5 hemodialysis candidates per million population per year[19] applied to the Series E projection of national population that the population paper recommended.[20] We assume that 20% of these candidates receive transplants, and exclude them from the projection. We use the data of the National Dialysis Registry as the basis for assuming that the dialysis population has a mortality rate of 15% the first year, 11% the second, and 7% in subsequent years.[21] We assume that one third of patients will be treated at home, one third in intermediate centers, and one third in hospital based centers. We average the costs for the two types of intermediate facilities at $10,000 per year. Finally, a substantial portion of the hemodialysis population will be hospitalized at any given time, primarily with problems of vascular access and infections. We estimate this fraction to be ten percent.[22,23] The projection does not include patients currently on dialysis and begins assuming we provide care to all who are eligible beginning in 1976.

The projected costs are impressive. The cost of maintaining the survivors of the first year group of patients to enter dialysis for twenty years will be $1.6 billion. At the end of twenty years, assuming we provide services to all who require dialysis, the annual cost will be $1.8 billion and we will have spent a total of $22.5 billion in twenty years.

We are in the "iron-lung age" of the care of patients with kidney failure. In the early fifties we cared for the victims of bulbar poliomyelitis with cumbersome iron lungs that were prone to technical problems and required a setting of major nursing care, whether by professionals or families. In the seventies we care for

most of the victims of renal failure with the cumbersome artificial kidney. Lewis Thomas would say that we are caught in the dilemma of "halfway technology" when we need a breakthrough to "genuinely decisive" technology.[24] The polio vaccine is an example of such decisive technology which made the iron lung unnecessary. Potential innovations such as a more efficient centrifuge dialysis machine which could markedly reduce dialysis time, or even an internally implantable artificial kidney, might markedly reduce patient discomfort and inconvenience as well as lower the hemodialysis bill. The development of methods for quicker and better tissue typing or of allowing recipients to tolerate donated kidneys more readily might allow a shift to more transplantation. A more precise understanding of the causes of kidney failure might lead to prevention of certain types. PL 92-603 Section 2291 has opened the federal treasury to pay most of the hemodialysis bill. There was no concomitant increase in support for kidney research at a time when support was concentrated on cancer-related research. By funding dialysis as a reimbursement for a personal service, there is only an indirect contribution to research, insofar as hemodialysis patients are cared for in settings appropriate for research. Investment in such research will be subject to all of the risk outlined earlier for investment in any research. There can be no guarantee of a successful result no matter how much money is spent. Unless good fortune brings a spillover from research in another area, we can only believe that the less research the less the chance of a breakthrough.

Our final major example is computed tomographic scanning. It is an example of a technology that is developing so rapidly that it is not possible to tell what the outcome will be, although many issues are clear.[25] In order to understand CT scanning, we will first present an explanation of the technological milieu into which it comes, followed by a brief explanation of the procedure itself.

TABLE I

Number of New Hemodialysis Patients by Years

Year Ending	U.S. Population Series E (millions)		New Dialysis Candidates	20% Transplants		New Dialysis Patients
1976	216	X 62.5/million/yr =	13,500	-2,700	=	10,800
1977	218		13,625	2,725		10,900
1978	220		13,750	2,750		11,000
1979	222		13,875	2,775		11,100
1980	224		14,000	2,800		11,200
1981	226		14,125	2,825		11,300
1982	229		14,312	2,863		11,450
1983	231		14,437	2,887		11,550
1984	233		14,562	2,912		11,650
1985	236		14,750	2,950		11,800
1986	238		14,875	2,975		11,900
1987	240		15,000	3,000		12,000
1988	242		15,125	3,025		12,100
1989	244		15,250	3,050		12,200
1990	247		15,437	3,087		12,350
1991	248		15,562	3,112		12,450
1992	250		15,625	3,125		12,500
1993	252		15,750	3,150		12,600
1994	254		15,875	3,175		12,700
1995	256		16,000	3,200		12,800

TABLE II

Survival of First Cohort of Dialysis Patients

With

Estimate of Twenty Year Costs

Dialysis Year	Year Ending	Patients Surviving
0	1976	(10,800)
1	1977	9,180
2	1978	8,170
3	1979	7,598
4	1980	7,066
5	1981	6,571
6	1982	6,112
7	1983	5,684
8	1984	5,286
9	1985	4,916
10	1986	4,572
11	1987	4,252
12	1988	3,954
13	1989	3,677
14	1990	3,420
15	1991	3,180
16	1992	2,958
17	1993	2,751
18	1994	2,558
19	1995	2,379
20	1996	2,213

96,497 patient years

96,497 ÷ 3 =	32,166 hospital	X $25,000 =	$ 804,141,650
	32,166 intermediate	X $10,000	321,656,660
	32,166 home	X $ 5,000	160,828,330
	3,060 home set-up	X $ 5,000	15,300,000
	9,649 hospitalized	X $36,500*	352,188,500
			$1,654,115,140/20 years

*$100/hospital day X 365 days/year

TABLE III

Survival of Next Nineteen Cohorts of Dialysis Patients

Year Ending	Cohort 2	Cohort 3	Cohort 4	Cohort 5	Cohort 6	Cohort 7	Cohort 8
1977	(10,900)						
1978	9,265	(11,000)					
1979	8,246	9,350	(11,100)				
1980	7,669	8,322	9,435	(11,200)			
1981	7,132	7,739	8,397	9,520	(11,300)		
1982	6,633	7,197	7,809	8,473	9,605	(11,450)	
1983	6,168	6,693	7,263	7,880	8,548	9,733	(11,550)
1984	5,737	6,225	6,754	7,328	7,950	8,662	9,818
1985	5,335	5,789	6,281	6,815	7,394	8,056	8,738
1986	4,962	5,384	5,842	6,338	6,876	7,492	8,126
1987	4,614	5,007	5,433	5,894	6,395	6,967	7,557
1988	4,291	4,657	5,052	5,482	5,947	6,480	7,028
1989	3,991	4,331	4,699	5,098	5,531	6,026	6,536
1990	3,711	4,027	4,370	4,741	5,144	5,604	6,079
1991	3,452	3,746	4,064	4,409	4,784	5,212	5,653
1992	3,210	3,483	3,780	4,101	4,449	4,847	5,257
1993	2,985	3,240	3,515	3.814	4,137	4,508	4,889
1994	2,776	3,013	3,269	3,547	3,848	4,192	4,547
1995	2,582	2,802	3,040	3,298	3,578	3,899	4,229
1996	2,401	2,606	2,827	3,068	3,328	3,626	3,933
	95,160	93,611	91,830	89,806	87,514	85,304	82,390

TABLE III

Continued

Year Ending	Cohort 9	Cohort 10	Cohort 11	Cohort 12	Cohort 13	Cohort 14	Cohort 15
1977							
1978							
1979							
1980							
1981							
1982							
1983							
1984	(11,650)						
1985	9,903	(11,800)					
1986	8,813	10,030	(11,900)				
1987	8,196	8,927	10,115	(12,000)			
1988	7,623	8,302	9,002	10,200	(12,100)		
1989	7,089	7,721	8,372	9,078	10,285	(12,200)	
1990	6,593	7,180	7,786	8,442	9,154	10,370	(12,350)
1991	6,131	6,678	7,241	7,852	8,513	9,229	10,498
1992	5,702	6,210	6,734	7,302	7,917	8,583	9,343
1993	5,303	5,775	6,263	6,791	7,363	7,982	8,688
1994	4,932	5,371	5,824	6,315	6,847	7,424	8,081
1995	4,586	4,995	5,417	5,873	6,368	6,904	7,515
1996	4,265	4,646	5,038	5,462	5,922	6,421	6,989
	79,136	75,835	71,792	67,315	62,369	56,913	51,114

TABLE III

Ended

Year Ending	Cohort 16	Cohort 17	Cohort 18	Cohort 19	Cohort 20
1977					
1978					
1979					
1980					
1981					
1982					
1983					
1984					
1985					
1986					
1987					
1988					
1989					
1990					
1991	(12,450)				
1992	10,582	(12,500)			
1993	9,418	10,625	(12,600)		
1994	8,759	9,456	10,710	(12,700)	
1995	8,146	8,794	9,532	10,795	(12,800)
1996	7,576	8,179	8,865	9,608	10,880
	44,481	37,054	29,107	20,403	10,880

TABLE IV
Annual Cost at Twenty Years

Cohort	Number of Patients
1	2,213
2	2,401
3	2,606
4	2,827
5	3,068
6	3,328
7	3,626
8	3,933
9	4,265
10	4,646
11	5,038
12	5,462
13	5,922
14	6,421
15	6,989
16	7,576
17	8,179
18	8,865
19	9,608
20	10,880
	107,853

107,853 ÷ 3 =	35,951 hospital	X	$25,000	=	$ 898,775,000
	35,951 intermediate	X	$10,000	=	359,510,000
	35,951 home	X	$ 5,000	=	179,755,000
	4,267 home set-ups	X	$ 5,000	=	21,335,000
	10,785 X 365 days	X	$ 100	=	393,652,000
					$1,853,027,000/year

TABLE V

Total Cost After Twenty Years

Cohort	Number of Patient-Years
1	96,497
2	95,160
3	93,611
4	91,830
5	89,806
6	87,514
7	85,304
8	82,390
9	79,136
10	75,835
11	71,792
12	67,315
13	62,369
14	56,913
15	51,114
16	44,481
17	37,054
18	29,107
19	20,403
20	10,880
	1,328,511

1,328,511 ÷ 3 =	442,837 hospital	X	$ 25,000 =	$11,070,925,000
	442,837 intermediate	X	$ 10,000 =	4,428,370,000
	442,837 home	X	$ 5,000 =	2,214,185,000
	132,851 X 365 days	X	$ 100 =	4,849,061,500
				$22,562,541,500

The usual x-ray consists essentially of a picture of the x-ray shadows cast by the subject. There are a limited number of shadow densities in the human body, notably air, fat (which is about the same density as air), bone, calcium, and fluid, which is the shadow cast by just about everything else. Only by being of different density than its neighbor is it possible for an organ to stand out. Furthermore, all of the shadows overlap, so that it is impossible to tell what is in front of what on an ordinary x-ray. For example, an x-ray of the skull shows little more than the skull bones. Indeed, this is why it is called a skull x-ray rather than a brain x-ray. Sometimes the pituitary, a tiny gland at the base of the brain, may stand out because it is calcified, but most of the brain, which comprises most of the contents of the skull, is seen as a homogeneous shadow of fluid density comprising gray matter, white matter, convolutions, ventricles, blood vessels and so forth.

Radiologists have devised a number of "tricks" to deal with the dual problems of overlapping of shadows and of the need for contrasting densities.

To deal with overlapping shadows, they developed "stereo" views, consisting of two x-rays taken from two points separated by the same distance as the human eye. When shown to the observer such that each of his eyes sees only the picture taken from the corresponding point, the observer's brain performs the same magic as it customarily does when he is looking at the world and he sees a three dimensional picture. Thus, a radiologist who looks at stereoscopic views of the skull of a patient with a calcified mass above his pituitary will see it quite vividly near the pituitary, whereas on a single film he can not tell whether it is in the brain or part of the skull.

A second trick to deal with the problem of overlapping shadows is called tomography. This is a method of blurring the shadows from all but one plane of the subject. For example, a tomogram of a cavitary calcified brain tumor will

show the cavity clearly whereas an ordinary skull x-ray will only show a calcific ball. Tomography still has fairly poor resolution and has a difficult time dealing with shadows of similar density.

In order to overcome the density problem, contrast agents were invented. For example, the brain contains hollow cavities called ventricles. Changes in their shape can be a helpful clue in the detection of tumors in the surrounding brain. Normally, they are filled with cerebrospinal fluid, which has a shadow about the same density as brain. The result is that they are invisible on a normal x-ray. In a pneumoencephalogram,this cerebrospinal fluid is taken out of the ventricles and replaced with air. As a result the ventricles stand out in clear contrast to the surrounding brain. Another example of the use of contrast is the injection of a liquid which casts a very dense x-ray shadow into the large blood vessels of the neck which lead to the brain. In these "cerebral arteriograms" the blood vessels of the brain stand out in clear relief. Changes in their position indicate pressure from tumors. In addition tumors often have large unusual types of circulation which may show up clearly.

Still another method of examining the body is through radioactive scanning. A wave is not passed through the patient, as in the case of the x-ray; rather, a radioactive substance is injected in the patient's blood which is picked up by brain tissue. Tumors may pick up an unusual amount of the substance. When a radiosensitive film or counter is placed next to the patient the tumor may show up as an area of increased radioactivity. This form of scanning thus depends on different abilities of tissue to pick up or retain a radioactive substance.

It is into this milieu that the CT-scanner comes. Basically, it consists of a device which passes x-rays through a subject at a defined number of positions around a complete circle. A computer circuit analyzes the signals transmitted through the patient to a receiver at each position of the circle and synthesizes

a cross sectional picture of the subject at that level.[26] The CT-scanner may be combined with the use of contrast agents to give better resolution. Radioactive material may be used as a source rather than x-ray, thus combining the benefits of traditional radioactive scanning with the new device.

The CT-scanner was first marketed in 1972 by a British firm. In the years since its invention, major technical improvements have been achieved and many others are under study, so it is impossible to say what the ultimate result will be. Initially, the instrument was used in the diagnosis of diseases of the brain. Marketing was aimed at the leading neurological institutions.[27] It has proven to be an excellent tool in the diagnosis of blood clots on the brain,[28] thus saving the cost of cerebral arteriography, a cost measured in terms of patient discomfort (since the arteriograms require the injection of dye into vessels deep in the patient's neck), and in morbidity (since this injection sometimes causes stroke), as well as in dollars. Thus, a patient with a bad bump on the head need not be subject to the unpleasantness and risk of arteriography if he goes to a center that has a CT scanner. The CT scanner is also proving to be helpful in the diagnosis of brain tumor[28] and may displace pneumoencephalography. This would be no great loss, since this is an expensive procedure (described above in the discussion of contrast agents) which quite commonly gives the patient a headache lasting several days, and which requires about three days of hospitalization.

The use of the CT scanner to supplant much arteriography and most pneumoencephalography raises issues beyond the relative accuracy and cost effectiveness of these procedures. It has major implications for manpower distribution in both neurology and neurosurgery. The diagnosis of blood clots on the brain is largely a matter of acute surgical decisions, usually involving a neurosurgeon in some capacity. There are about 2600 active neurosurgeons in the United States.[29] Somewhat over half work in hospitals that are only moderately well equipped.[30]

Are each of these hospitals to be equipped with a new CT scanner at a cost of $385,000 each? Surely the distribution of CT scanners and neurosurgeons will follow one another to some degree. Should the CT scanners follow the neurosurgeons or should the scanners be regionalized with the neurosurgeons following along?

The diagnosis of brain tumors in contrast to that of blood clots in the brain is usually not of acute concern. The workup must be expeditious, but need not be done as an emergency. Patients may often have an opportunity to choose, as patients with blood clots on their brains may not, which neurologist or neurological institute they will entrust with their workup. Certainly every neurologist or group of neurologists will want to have access to a CT scanner, for what patient will want to have a workup that does not include a picture taken by this wonderful new machine? It is rather unlikely that those groups or institutions in possession of a CT scanner will do many studies on someone else's patients. Again, the distribution of the machine and the specialists will tend to follow one another.

Clearly, in institutions having a high volume of neurological and neurosurgical cases, the CT scanner has become a necessary diagnostic tool. A Canadian study describes the early experience at the Toronto General Hospital with the CT scanner.[31] It estimates the savings in the form of averted hospital days and surgical tariffs from angiography and pneumoencephalography after the costs per CT scan have been deducted ($100 per study) to be $1,000,000 per year at that institution. It remains to be seen what the cost effectiveness will be at smaller institutions with a small volume of patients where the capital investment in equipment may become an important factor. Even at large institutions, it remains to be seen what the cost effectiveness will be when the test becomes increasingly well publicized and popular, so that it is used to reassure increased numbers of patients who are worried but have little likelihood of having organic disease.

The method of reimbursement for scanning may well have an effect on their

distribution and cost. For example, if the machines are placed in neurological institutes, the cost of the procedure might be included in the neurological workup. More likely, the neurologist would bill separately for this procedure. If in addition an interpretation by a radiologist is deemed necessary,[32] this would presumably add to the cost. Reimbursement as a fee for each study performed would presumably make it more likely for the machines to be concentrated at larger centers, where the volume would allow CT scanning to generate capital for the institution at the same charge for each procedure that a smaller institution would find it impossible to break even.

The potential of the CT scanner is not limited to the diagnosis of neurologic disease. Recently, total body scanners have become available, at a cost of $400,000 to $585,000 each. These may be used to detect blood clots in the lung, to outline the ducts of the liver in order to determine whether or not a patient has obstruction of the bile ducts, or to outline the pancreas -- an organ which has for many years eluded radiologic delineation.[33] All of these are potential breakthroughs in areas where current diagnostic techniques are either invasive or unsatisfactory. Theoretically, the CT scanner might supplant liver scans, lung scans, transhepatic cholangiography, pulmonary arteriography, and so forth. On the other hand, it might for many purposes prove to be a test of marginal usefulness but great magical effect which because of its relative lack of invasiveness could become very popular. At $585,000 each, if only one third of the community hospitals in the country were to order the machine the capital investment alone would be $1 billion.[34] In fact, some thirty-five companies are currently vying for the market, with a projected billion dollar demand of 2000 machines a year.[35] The price of a machine, which might have gone down after the initial research and development costs were paid for, is staying up, mostly because of the large demand.

In sum, the CT scanner is an example of a diagnostic device which is currently at the threshold of new technology. Whether it proves to be a widespread diagnostic revolution, or a tool of circumscribed usefulness, it has substantial implications for capital, manpower and organization of health care.

In the face of the myriad effects brought by new technology, there exist established methods of evaluating many of these effects. Many of these methods belong in the category of applied medical science research, which is receiving increasing attention for the contributions it can make, building upon a base of more traditional epidemiology and biostatistics. We will use the diagnostic workup of high blood pressure and the decision to use medical or surgical therapy to illustrate some of the methods of this applied science research. Although the data are still incomplete, they are more reliable than in many other areas. The evidence does not clearly indicate that one or another decision is superior, but it is the kind of evidence that should provide the basis for such decisions.

Most cases of high blood pressure are due to "essential hypertension," which has no known underlying cause. In spite of this fact, such high blood pressure is quite treatable, requiring the patient to take drugs to lower his blood pressure for many years. About ten percent of patients with high blood pressure will be found to have an underlying cause, if a thorough workup is done.[36] This underlying cause is usually some form of kidney or glandular disease. For a long time, it was medical dogma that every case of high blood pressure should receive a complete workup[37] in order to identify this ten percent of patients. In fact, most of the ten percent will respond to the same medicines as patients with essential hypertension, but some of their underlying conditions may progress to more severe conditions if left untreated. If the underlying cause of the high blood pressure is removed, it will not be necessary for the patient to embark on a lifetime of drug therapy.

The problem with the logic behind the long standing recommendation that every patient should have a thorough workup for high blood pressure is simply that it does not go far enough. It is first of all based on the assumption that every physician should do everything possible to diagnose and treat his patients. Few will quarrel with this. Some will add, however, that society, acting out of its need to set priorities on the utilization of its resources, may set limits within which physicians can act in this way. The next assumption is that it is always best to treat an underlying disease rather than treat merely its signs and symptoms. In this instance, whenever high blood pressure is a sign of an underlying disease, that underlying disease must be sought out and treated. Clinical judgement must not stop with this dictum, but go further to consider the relative assets and deficiencies of various approaches, for it may be more dangerous to diagnose and treat the underlying disease than to treat its signs, given the current state of medical knowledge.

In what is probably destined to be a classic series of articles in the "New England Journal of Medicine,"[33] McNeil et al. demonstrate the kind of thinking that is necessary for society in evaluating the costs and rewards of a diagnostic program and, equally as important, the kind of thinking that is necessary for physicians as they evaluate the diagnostic and therapeutic steps to take with their patients. In regard to the first, they calculate the cost of actually determining the amount of underlying kidney disease in the entire American hypertensive population and of subsequently treating these patients. They include the outcome in terms of patient mortality. They make these calculations for several diagnostic strategies. Their analysis includes the costs if only a kidney x-ray using contrast material (an "i.v.p.") is performed, as well as the cost if the i.v.p. is used in conjunction with a kidney radioisotopic scan ("renogram"). Since the latter has many potential cutoff points between normal and abnormal, depending on

how specific and sensitive a test is desired, they make their calculations for several reasonable cutoff points. The estimated total cost of identifying and treating the entire U.S. population with underlying renal disease as a cause of high blood pressure is between $7½ and $13 billion.[39] Apparently overwhelmed by the magnitude of the expense, they conclude that this is not economically feasible. When compared with the expense we calculated for treating patients with hemodialysis, it seems to be of approximately the same order of magnitude. Of course, the dollar amounts are a little difficult to compare, since their estimate was calculated as a total expense over the next fifteen years in current dollars for diagnosis and treatment of all patients who currently have high blood pressure. They did not estimate the ongoing cost of diagnosis and treatment of patients who develop high blood pressure in subsequent years as we did for hemodialysis patients. This money would be spent on approximately 23 million people, whereas the dialysis money would be spent (at fifteen years) on 100 thousand people. In the case of dialysis that will mean 100 thousand lives maintained. In the case of high blood pressure one would have to determine how many lives would be lengthened by such a thorough approach.

The specific amount of their projection is not as important as their method of thinking about the problem. The key concepts of their first two articles are that:

1. It is possible to analyze the effect of a strategy of diagnosis and therapy in terms of its total cost, average cost per patient found, and average cost per patient cured.
2. It is possible, given the current level of complications of diagnostic methods and of failure of therapeutic procedures, to calculate the number of persons who will die from diagnostic and therapeutic maneuvers and compare this with the number of those whose lives are lengthened.

3. It is much more difficult, though not impossible, to compare the amounts of disability and discomfort incurred and alleviated in the same framework.

4. A more technical point, for those who set the boundary between normal and abnormal of tests that have essentially continuous results, is that this boundary should be set in the above framework, to minimize harm to patients, maximize benefits, and keep the cost within reason.

5. Finally, the relevant cost of an additional test within a strategy of diagnosis and therapy is the marginal cost of improving one more patient due to the addition of this test.

In the last of their series of articles, McNeil et al. go beyond the above calculations and concepts.[40] They use the results of sixteen year follow-up of patients with high blood pressure initially aged 45 to 54 in the Framingham Study to compare two alternative treatment strategies, one a strategy of treating such patients with drugs alone without attempting to diagnose underlying surgically treatable causes, the other a strategy of seeking out and treating all patients who have such surgically treatable causes. Their calculated outcomes show that the results of the two strategies are currently so close that there are far more reliable predictors of patient outcome than which of these therapies are chosen, namely the patient's initial diastolic blood pressure, sex, and a variable called "compliance." Compliance is defined as the degree to which patients actually take the medicine prescribed for them as well as the degree to which the treatment of their high blood pressure with drugs is aggressively pursued. Thus, patients who have a high initial blood pressure but low compliance are more likely to benefit from an aggressive approach to diagnosing and treating underlying surgically treatable kidney disease. Patients with low initial blood pressures and high compliance are more likely to benefit from a strictly medical approach.

This last article will not settle the controversy about how to diagnose and treat patients with high blood pressure, but it does represent a step forward in its method, essentially one of comparing the total set of outcomes for different diagnostic strategies. It contains certain assumptions that may be questioned, but these may be viewed as potential foci for future research. Underlying its method is the crucial principle that, for any given condition, we must look at the total system of diagnosis and therapy in order to make our clinical decisions and societal planning, not just at its component parts.[41]

In their traditional role of doing everything possible for each of their patients, physicians are currently behaving as if medical diagnosis and subsequent treatment were an economic free good. Since such a large proportion of the bill is paid for by sundry third party sources, in most instances there is little restraint on the amount of funds expended. On the one hand, it is unlikely that the patient or his family will pay directly for the service; on the other, none of the third party payers has the power to say to any great extent what services they will and will not support. Currently at 8.3% of the Gross National Product,[42] it is unlikely that the total medical bill will stop increasing. While there may be some breakthroughs to high level technology, there is nothing to suggest that we will not continue to proliferate mid-level technologies of high marginal costs for each patient benefited or even of only theoretical benefit, which each individual physician, acting in all good conscience, will seek for his or her patient. For various reasons, it is unlikely that any real decision-making as to the allocation of personal dollars to health care will be put in the hands of individuals, thereby introducing the constraint of a market. The likelihood, then, is that the bill will steadily increase until the federal government is called upon to pay it.

It is unlikely that the federal government will pay the entire medical bill without introducing some level of constraint. The exact form of constraint will

depend largely on the financing system chosen. If a fee for service system is retained, the simplest way of introducing constraint would be to decide which services National Health Insurance would and would not pay for, i.e., which technologies would and would not receive this form of federal support. In making such decisions it will be necessary to deal with many of the thorny problems suggested by this paper. It will be necessary on the one hand to avoid repeating situations similar to those of the past when, for example, in the early 1960's, of almost 800 hospitals expensively equipped to do closed heart surgery over 90 percent did not average as much as one case a week, at great waste of dollars and increased risk to the patients on whom such surgery was performed.[43] Thus, it will be necessary to limit the spread of technology to those situations in which it really is useful. It will be necessary to limit the rapid spread of potentially beneficial technology until it is of demonstrated effectiveness. In so doing, we will run the risk of delaying the use of beneficial technology in order to prevent the spread of useless or even harmful technology. Our example of the CT scanner, for instance, may be an instance where limitation of spread would prevent unnecessarily wasted resources, or it might be an instance where restraint would unnecessarily bridle a major diagnostic breakthrough.

It is probable that any task force, assigned the responsibility for recommending action on almost any medical problem, must recommend in all good conscience that more money be spent. To do otherwise would be to recommend ignoring a constituency of the suffering, no matter how large or small. Choices between these constituencies can only be made at a level responsible for them all. The challenge will be to provide a decision-making forum in which all sides of an issue can be heard and documented. A well-informed, full time medical decision-making body will probably be required. Hopefully, decisions as to which forms of medical care we will support on a national level will be made as strictly as possible in public. Ground

rules may be laid down whereby evidence must always be presented which provides data based on a total system of diagnosis and therapy, similar to the types of data suggested above. For example, the incidence and prevalence of the target condition must be determined. As a start, the conditions selected for decision-making might be those that affect the most people, that are likely to be the most expensive, or for which diagnosis and therapy involves the most risk. The long term costs of a diagnostic and therapeutic program must be considered, as well as their long term benefits, perhaps sometimes using methods similar to the ones used in our calculation of the costs of hemodialysis. Such an approach will inevitably have the effect of exposing areas where our knowledge is inadequate. Such a decision-making body will need a capable technical staff to assist in the gathering of data, and it will probably need to have some mechanism for instituting studies to clarify areas of ignorance. Provision must be made for hearing opinion other than that of the staff. Although its supporting staff will undoubtedly include many epidemiologists, biostatisticians, and medical scientists, the decision-making body itself should be no means consist entirely of such specialists. All of the evidence presented to such a body must be readily available in such form that the data or its method of collection may be reanalyzed in a public forum to confirm its validity or see how well it supports an alternative hypothesis.

There are many potential pitfalls for such a method of constraining expenditure. The most important one to avoid is the potential for creating an arbitrary set of rules that are unnecessarily harmful to many patients. Just as a government of laws is designed to promote justice rather than mercy, a health care system of regulations may promote equity but suppress the potential to make crucial decisions for individual patients. It is unlikely that enough studies can ever be done or the exhaustive regulations ever be written which could decide the approach to every patient. This is because of the great variation between patients, even those with

the same medical problem, which may dictate many different diagnostic and therapeutic strategies. We have seen, for example, that a variable called "compliance," which may reflect a patient's ability to maintain a drug regimen or even his confidence in his physician, became a deciding factor in a consideration of which diagnostic strategy is likely to be most successful in the approach to high blood pressure. Until the infinite number of studies are completed which delineate all of the variables which lead to the choice of the strategy which has the best chance of success, individual physicians must be allowed to use their experience to make decisions based on variables which are not accounted for in the general guidelines.

Whatever the form of a decision-making body such as the one tentatively suggested above, it will undergo great pressures. Sooner or later everyone gets sick and dies. Every disease will have its constituency of those who are or will be suffering or dying because of it. Today, the constituency of this decision-making body would literally be 216 million such people. If dollars spent on health care become a scarce resource and each dollar spent on one program of prevention, diagnosis, therapy, and/or education or research, is viewed as a dollar taken away from another such program, it will take the wisdom of Solomon to make the necessary decisions. The new technology affects health care organization because it confers prestige and privilege on those institutions and individuals who are in possession of it. Millions of jobs are based upon it. Vast sums must be allocated to capital and operation. Decisions in one sector will affect others. In this complex arena, where clear-cut decisions are a scarce resource, the task is to maintain a just decision-making process. At least, we may hope that the decisions made, as well as the raw evidence on which the decisions are based, will be kept strictly in the public domain.

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20 Gillings, Dennis, "U.S. Population Growth Towards the Year 2000," p.

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22 It is a poorly documented fact that a considerable fraction of dialysis patients are hospitalized at any given point in time. The ten percent figure is a conservative estimate of the experience at the North Carolina Memorial Hospital based on a conversation with Dr. Mattern, head of their dialysis unit. This estimate has a moderate effect on the overall projection of the costs of hemodialysis. Because the true rate may be higher, it is an observation which deserves documentation.

23 Even if it is impossible to be precise in this estimate, it is quite possible to point out the key variables, with some comment on our level of ignorance. First, as noted, the most important variable is the incidence of candidates for hemodialysis. This is unknown for two reasons, the fact that the ICDA coding of mortality is not specific enough to identify these patients (since it was never intended to do so), and the fact that the criteria for acceptability into a dialysis program are ever widening. Such widened criteria are likely to have the effect of increasing the mortality rates of dialysis patients as more complicated patients are accepted. On the other hand, improved technical management, the second key variable involved, may lower this mortality rate. Although we carry out the projection of cost for twenty years, obviously no one has yet lived twenty years so that it really is impossible to determine what the mortality rate will be then. The current mortality rates are somewhat better than those expected by Gottschalk et al. in 1967. A third major variable is the proportion of patients undergoing transplant surgery. It is quite hard to foresee how this proportion will change. It is lamentable, however, that there are separate hemodialysis and transplantation registries. This is another example of fragmentation. What is needed is not a registry based on these procedures but one based on patients with chronic renal failure. Currently patients can shift back and forth between the two registries, without the one knowing what the other is doing. Finally, of course, there are the unknown hoped for technological breakthroughs which may lower cost as well as the indeterminate future costs depending on market forces or price controls. The present estimate does, in spite of these areas of uncertainty, quite probably indicate the magnitude of the expense.

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It will be apparent to many readers that many of the specific methods used in and cited by our paper are those of cost benefit analysis. It is our opinion that cost benefit analysis techniques can be very helpful when applied to systems of diagnosis and therapy. We do, however, not believe in the final step which often converts human lives into dollars. This has relied on such absurd assumptions as equating the present value of a housewife's life with that of future income which she would earn as a housekeeper (since she receives no salary in her occupation) whereas her husband's life would be worth much more, being the present value of, say, a plumber's earnings.

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ORGANIZATIONAL ISSUES IN THE DELIVERY OF NATIONAL HEALTH CARE

Connie Evashwick
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ORGANIZATIONAL ISSUES IN THE DELIVERY OF NATIONAL HEALTH CARE

by Connie Evashwick and Glenn Wilson

The United States is known throughout the world for its leadership in developing and managing large and complex organizations. The organization of health care delivery is an anomaly. In the face of management expertise, health care delivery remains "a large cottage industry" which is criticized as being inefficient, ineffective, and unresponsive to public needs.

Many of the dilemmas of health care delivery stem from the organization within and between health service institutions. The following analysis will explicate the factors in an organization which affect efficiency, effectiveness, and responsiveness and will demonstrate some of the problems in managing health care delivery organizations.

The basic elements of an organization are delineated in Figure 1. The purpose of an organization is to accomplish a given goal or set of goals. Goals, which are usually stated in broad terms, are translated into specific tasks which must be done in order to achieve the goal. Once the tasks are defined, the personnel roles and the structures needed to accomplish the tasks can be identified. The structure includes lines of authority, communication, and control all of which operate to ensure that the components of the organization relate to each other properly and that the tasks are indeed performed. External social,

political, economic, and technological forces act on all of the organization's components separately or collectively and may provoke change. Performance is measured in terms of efficiency, effectiveness, and responsiveness.

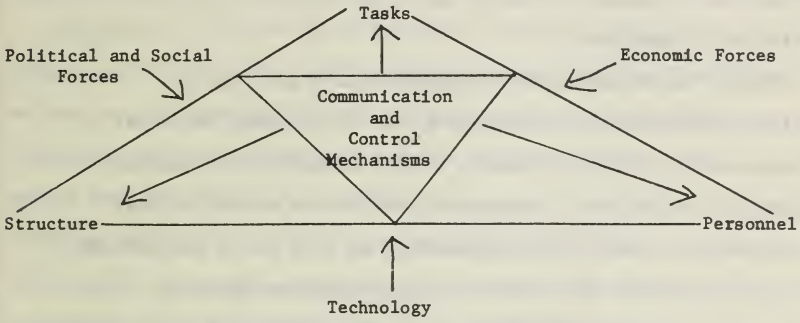

Figure 1: Basic Elements of an Organization

Efficiency may be defined as the relationship of resource inputs to outputs, e.g., goods or services. High efficiency means maximum use of resources to achieve high productivity at low cost. Total cost of producing an output varies with the unit costs of the inputs and with the efficiency of the production or service process. The more clearly defined the output and the more cohesive the components of an organization working toward that output, the higher the potential ratio of outputs to inputs.

Similarly effectiveness may be defined in terms of goal achievement. The more precisely the goal, or desired output, is defined and the more the parts of an organization are coordinated and focused on attainment of that goal, the greater the likelihood that the desired output will be produced. Perceptions of the organization's effectiveness will vary to the extent that the expectations of the output vary.

Responsiveness may be defined as the rapidity and degree to which an organization alters its goals, personnel or structure due to the pressure from external forces. The extent of change depends on where and what type of pressure is applied and on the cohesiveness of the organization's components.

Overall, the better defined the organization's goals and the more tightly interwoven the components of the organization, the better the organization performs in relation to goal achievement and maximum utilization of resources. A fundamental problem with efforts to alter the performance of health care organizations and with health care delivery on a national basis is that there is no agreed upon goal or set of goals. The personnel and structure of medical care delivery are not related so that the various providers act in unity to accomplish agreed upon outcomes. Without specific objectives and organizational integration, criteria for efficiency, effectiveness, and responsiveness cannot be defined, let alone altered. These issues will be discussed in detail below.

HEALTH CARE DELIVERY ORGANIZATION

Goal Definition

A hospital will serve as an example of the basic problems of a single health care organization. Most of the problems described pertain to all levels of health care delivery.

An organization is based on the premise that more can be accomplished toward reaching a common goal if people pool resources and divide tasks than if individuals work alone. Much of medical care, however, is delivered by physicians working independently, and the outcome is the

betterment of each individual patient, not necessarily of the community or society. Organization for mass production does not apply to medical care delivery.

The goal of a hospital may be stated as "providing high quality patient care at reasonable costs." The hospital has been known traditionally as "the doctors' workshop." The general goal of the institution may not necessarily be consistent with goals of the practitioners. The goal of each physician is to provide the best care for each of his individual patients and to develop his own professional career. To obstetricians, for example, maternity means pre-natal care and the availability of fetal monitoring and pre-mature infant incubation equipment; to surgeons, high quality may mean having highly-equipped surgery suites and a complement of surgical technicians and anesthesiologists; to radiologists, high quality may mean having a $600,000 EMI scanner. Since third party payers assume the financial costs for care, "reasonable cost" may have little or no importance to physicians or patients.

To the hospital management, the tasks involved in meeting the general goal may include providing nursing care, keeping the facility clean and in good repair, serving food according to diet specifications. The part of the goal "at reasonable cost" may mean maintaining a high occupancy rate, hiring a minimum number of personnel, and not purchasing unneeded equipment. With a finite number of resources, the hospital cannot possibly provide all the resources necessary to meet all goals of all physicians as well as its goals as an institution.

The multiplicity of goals evident in a hospital is even more evident in viewing the spectrum of organizations in the health field. Organizations

range from the provision of health and medical care by an interdisciplinary team of personnel to all people of all ages at all income levels, to the provision of acute medical care to the individual patient by an individual practitioner. The tasks of health care providers and organizations include: to provide in-patient medical care, out-patient medical care, preventive health care, counseling; to undertake research and teaching; to employ the most advanced technology available for each case; to reach all citizens but maintain low costs; to please consumers with efficient, effective, high-quality personal care, and meet community needs while focusing on care of individuals; to meet the career goals and salary demands of the numerous professionals and semi-professionals, to encourage team medicine, and to foster the development of new specialty roles.

Since tasks, structure, personnel, and performance review criteria are based on goals, it is evident why, from a nationwide perspective, the health care system may appear to lack rational organization and why performance may be difficult to measure. The goals are stated in such broad and ambiguous terms that they are of minimal use in specifying tasks, aiding in resource allocation, or determining the adequacy of outcomes.

Personnel and Provider Roles

Once goals and tasks are determined, the roles and the personnel needed to perform the tasks can be identified. A community hospital, for example, might specify its goals to be "high quality patient care at reasonable cost for in-patients at secondary and tertiary levels and out-patients at primary and emergency levels of medical care need." Ideally, the medical staff would include physicians who would do primary care, specialty care, sub-specialty care, and emergency room

care; nurses who would work in each of these types of care; and clerks, maintenance personnel, housekeepers, aides, orderlies, and administrative staff. The appropriate number and combinations of personnel, particularly physicians, would be designated to care for the patient load for each type of care.

In reality, the hospital as an organization has little to say about the numbers or types of physicians on its staff. The Board of Trustees must approve physicians admitted to the staff, but the Board usually accepts the recommendation of the medical staff. The medical staff does have some control in that it may or may not recommend privileges be granted to applying physicians. Hospitals or medical staffs, however, rarely recruit physicians (except for emergency room coverage); rather, a physician chooses a practice site and then appeals to the nearest hospital for membership. Thus the hospital may or may not have the appropriate physician complement to meet even its very general goals.

Role differentiation for most types of personnel in the health field tends to be vague and is frequently inconsistent. The personnel functioning in the health field include more than a dozen professions, 36 specialties in medicine alone, more than 30 other occupations or semi-professions, and an untold number of auxiliaries, technicians, and support personnel. Not only are the roles of personnel not clearly related to an overall goal, but there is considerable ambiguity about what personnel are supposed to perform which tasks. Nursing is a classical example. Nurses aides, licensed practical nurses, and registered nurses, are all responsible for the nursing care needs of patients. There may be a great deal of overlap in what various categories of employees do, and there may be some tasks which none of them believes they should do.

In the traditional diploma nursing program, hospitals trained nurses on site and kept many of them on as staff. This was a way in which the numbers and types of personnel could be produced in conjunction with the needs of health care providing institutions, and personnel would have jobs compatible with their training once they graduated. Most of these programs have been phased out in the past decade. Presently, most health care personnel are trained primarily by educational institutions which function independently of health care providing organizations.

A significant factor in the personnel considerations of health care organizations and of the health field overall is the extent of professionalism. Professionals go through extensive training and have an understanding of a body of knowledge which anyone outside of the profession does not share. Only those in the same training can direct and evaluate the work of fellow professionals. Part of professionalism is a commitment to goals which are based on the goals of the profession, not of any given institution. In recent years, nurses, social workers, pharmacists, physical therapists, and various other types of health personnel have begun to claim professional status. For almost all types of personnel, there are national, state, and local "professional" societies, each promoting the goals and independence of that category of personnel. Most of these personnel are employed by the hospital or health care organization and thus are subject to financial rewards and penalties, but hospitals are nonetheless faced with motivating numerous professional-aspiring types of personnel. This inhibits even further a hospital's attempts to form a single organization based upon common goals, cohesive structures, and accepted criteria for efficiency and effectiveness.

Between health care institutions, the same lack of clarity of roles persists. Health care organizations have their own individual goals which may or may not be compatible with the overall goals of the nation or state for health and medical care. This may result in unnecessary duplication of resources to perform some tasks and an absence of resources for others: in some areas, all hospitals have 24-hour emergency rooms staffed with physicians, nurses, and emergency care squads, while in other areas no fully-staffed emergency rooms are open and there are no personnel with special training in emergency medicine.

To further complicate the role differentiation of hospitals, there are various categories of institutions which often have overlapping responsibilities. In a large city, for example, there might be several community hospitals, a county hospital, a state hospital, a Veterans' Administration Hospital, several local community health centers, public health departments, and community mental health centers, many assuming some similar tasks for the same populations as a result of government mandate.

At the organization and inter-organization levels, effectiveness and efficient utilization of resources cannot be achieved unless there is definition of tasks and designation of responsibilities for task performance. The ambiguity which pervades the present health care delivery system fosters individual definitions of desired outcomes and lack of acceptance of responsibility for overall resource allocation and use.

Structure

In addition to goals and personnel, an organization must have a structure which will facilitate accomplishment of its tasks. Structure

spells out the interrelationship of the tasks to the achievement of the broader goals and specifies the relationship of one group of personnel to another. The structure defines the decision-making sites, identifies the sources of authority, and provides the mechanisms to evaluate the organization's output and performance. The purpose of structure is to ensure that the resources needed to complete the specified tasks are available and that the processes involved in completing the tasks are coordinated. The greater the number and the more complex the tasks involved in achieving any one goal, the more complicated the structure must be to get the components to function in unison.

Undoubtedly, health organizations have some of the most complicated and most unconventional structures to be found. On paper, the administration and the professional staff are represented as two groups which are linked through a relationship of the Chief of the Medical Staff and the Administrator of the hospital. In reality, the hospital is composed of an administrative structure concerned with the performance of the hospital's tasks and a whole series of professional structures related to the performance of the individual physician's tasks.

The administrator has authority as the management to make decisions about resource allocation, structure, personnel, and goals. The physician, however, by virtue of being at the top of the hierarchy of health care professionals, has independence from the management in deciding his own duties and has authority over personnel and resource allocation which tends to supersede administrative authority. For example, an administrator may have funds to hire a limited number of nurses and may assign three nurses to cover an 8-bed IC. The physicians mightrequest a nurse for each patient. The nursing staff would feel

compelled to meet the physician's standard for high-quality patient care. Eventually, the nursing staff and the physicians would force the administrator to hire additional staff and place more nurses in the ICU. In the meantime, nurses would be called in from other floors or asked to work extra shifts to cover the ICU. The number of professions and the extreme degree of professionalism exhibited in hospitals and health care organizations severely limit the power of the administrator.

The problem of professional dominance is further complicated by the fact that there is in reality little effective coordination between physicians in a hospital. If physicians acted in concert, at least the goals of physician patient care and service would be expressed and defined by one body. On most hospital medical staffs, however, the physicians practice independently of the hospital and of each other. There is no means of joint decision-making between physicians and the hospital administration to deal with basic hospital concerns. The majority of acute care general hospitals have a formal medical staff and a Chief who reports to the Administrator of the hospital, but the responsibilities of the medical staff tend to focus on patient care practice through tissues committees, medical audit committees, education committees, etc. The medical staff does not routinely address issues related to the hospital, yet as the major decision-makers about patient care, they have great effect on the hospital as an organization.

The hospital administrator faces dilemmas such as one group of physicians requesting new x-ray equipment and another group of physicians asking for new operating room equipment. At several hundred thousand dollars per request, and limited dollars for improvements and additions, the hospital cannot possibly respond to all demands. The hospital must

decide about space, equipment, materials, auxiliary personnel, staff responsibilities, and policies about patient care. Without a clear statement of priorities from the medical staff as a whole and without a structure for dealing with physicians as a group, competition for resources may result in conflict and confusion. There tends to be as little coordination between professional groups as among them, so the administration is also faced with trying to satisfy the diverse needs of many individual professionals and groups of professionals.

Technology is a major determinant of the structure of health care delivery organizations. Illnesses occur at random, are for the most part unpredictable in individuals, and are manifested differently in each individual. These features lead to each case being treated individually and requires flexibility in the internal arrangements of a health care delivery organization.

Medical knowledge of the cause of many illnesses and the most effective treatments for a specific illness are in relatively early stages of development compared to other sciences. Until 25 years ago, a physician could know almost all that was known about the treatment of a specific case. Physicians thus tended to be generalists and solo practitioners. The recent growth of knowledge and the development of biomedical technology makes it difficult for any single individual to know all that there is to know about treating all types of illnesses. This has resulted in division of labor, or specialization, and an increased dependence on the hospital for capital and personnel resources. These changes have not yet been accompanied by a concomitant integration of the physicians or of the physicians and the hospital. This is the source of the standard complaint about the fragmentation of medical care and it also is the cause of the competing demands within an organization for support resources.

Structure includes control mechanisms in addition to coordination and communication lines. Control is usually enforced through financial and fringe benefit remuneration and by career or professional rewards. A hospital has little control over physicians either through professional perquisites or money. Except in the few for-profit hospitals which are owned by physicians and a few corporate arrangements, physicians have no financial responsibility for a hospital, nor have they any accountability for the financial implications of their decisions about medical care. Control also requires that the organization have a way to evaluate performance outcomes. Physicians as well as other health professionals tend to have independence in assessing patient care. In short, the control mechanisms of authority, professional competence, and financial remuneration in general are not available to the administrative structure of a hospital to use in affecting the behavior of physicians and some other professionals.

In general, the relationships between the institutions in the health field, as well as the practitioners, are often poorly defined. Providers and consumers, health care delivery and education institutions, exist independently of one another, with no standard means of coordination or communication.

Hospitals are a good example of institutional independence. Basically, each hospital has a "service area" defined along any number of dimensions, from geographic location to religious affiliation. Each hospital attempts to provide as full a range of services as possible for its patient population, regardless of the cost of the service or the availability of similar services in proximal hospitals. The lack of role differentiation results in duplication of some services, lack of other services, and inefficient use of scarce resources. The overlap and

lack of coordination between governmental health agencies is another example.

Lack of structure exists not only between institutions, but between all components of the health care delivery system. Within the field of health care delivery there are professional associations, such as the American Medical Association and American Nursing Association; institutional alliances, such as the American Hospital Association; many non-profit agencies, such as Zero Population Growth and the American Public Health Association, and innumerable government institutions and programs, such as the Veterans' Administration and the Community Mental Health Centers. Each of these holds a goal related to the broad goal of patient care, but the relationship between these organizations is completely unstructured.

The control mechanisms of the health care field reflect the lack of goal clarification and proliferation of professional specialization. The availability of services, for example, is not uniform in terms of geographic or specialty care because practitioners and institutions have considerable freedom of choice to define the population they will serve and the types of personnel they will employ. Particularly because of the heavy value placed by American society on freedom of choice, the control mechanisms available to influence such decisions are quite limited.

One factor which contributes significantly to the lack of integration of health care organizations and the health care field is the payment mechanism. Two-thirds of all health and medical services are paid for by third-party payers: one-third by private insurance carriers and one-third by government. These sources are actually

external to the organization(s) of health care delivery. This greatly limits the control of efficiency and effectiveness. Coupled with the inability to evaluate the technical competence of medical care delivery, third-party payment renders consumers the least influential parties in the delivery of health care services. Physicians and hospital would be more dependent upon each other if the financial interdependence were greater. None of the third-party payers alone can force significant change in efficient use of resources because institutions and providers can always fall back on other sources of funds. In summary, the loose structure of health care organization is reflected as well in a loose set of control mechanisms.

EXTERNAL FORCES

Forces external to the health care field may have considerable influence on the internal arrangements and performance of the institutions as separate entities and as a group. Health care exists in an unusually complex environment. With the national acceptance of health care as a "right," political and social forces provoked changes affecting almost all health care delivery institutions and providers. Third party payment by government and private insurance companies make the financial status of health care organizations subject to economic constraints imposed by external sources. Consumers have little individual dollar bargaining power, but as recipients of services which may be guaranteed by the government or other third parties, public opinion may apply pressures for change. Due to the large number of professionals and other categories of specialized personnel, professional trends affect both practitioners and organization. As a scientific-based discipline in which the technology is rapidly changing, organizations and practitioners are constantly adapting to technological innovations.

The development of coronary monitoring equipment, for example, affected medical care of coronary victims throughout the United States. This development resulted in a change in many physicians' goals to include in the "highest quality care" for cardiac patients use of cardiac monitoring equipment. For hospitals, this new task means changing bed space to establish a coronary care unit, purchasing equipment, training nurses in coronary care, and developing procedures and guidelines about admission to the CCU from the in-patient ward or emergency room. A change in one factor of the organization's environment thus may have implications for the organization as a whole.

At the same time, changes in the environment which are intended to alter the performance of an organization need to be made on the component of the organization which has the most direct relationship to the change desired, and the ramifications on the other parts of the organization need to be considered. For example, the decision by the nursing staff to attend continuing education programs in coronary care specialization would be to no avail unless the physicians had decided special coronary care should be provided in the hospital and the administrators had decided to purchase the equipment and renovate bed space to create a coronary care unit.

External forces may also affect the character of the composite health care delivery system. Changes in attitudes during the 1960's led to the acceptance of health care as a "right." This led to national financing of Medicare and Medicaid, which in turn caused or contributed to changes in hospital admissions and collection policies, the development of extended care facilities, the proliferation of nursing homes, alterations in the modes of medical treatment to conform to regulations implemented to control costs, increasesin the provision of home care

and renal dialysis programs, the expansion of hospital clerical staffs and computerized billing systems to handle the paperwork, and the growth of state agencies to enforce facility and recipient certification requirements.

The broad range of factors affecting health status and their effect on health care organization are crystalized by the role of the government, which is itself a major external factor affecting health care organization. The department of social welfare, for example, certifies recipients of health and social services; the department of health operates institutions from one section and clinics from another; the council for the elderly seeks health and social services for the aged. Each of the agencies may act entirely independently of the others. State enacted "certificate of need" regulations, for example, often conflict with federal formula for health facilities used by the Hill-Burton Program, and the regulations may vary from state to state as well. The number of governmental agencies at all levels which relate in some way to health care and the minimal coordination between various government agencies whose activities affect health care create a very complicated political context for health care delivery organizations.

PERFORMANCE: Efficiency, Effectiveness, and Responsiveness

Efficiency depends upon having a defined and measurable output, a close relationship of inputs to outputs, and the ability of an organization to exercise control over the intervening processes and personnel to ensure that minimum resources are used to produce maximum products. As has been shown, health care organizations are not in a position to set or enforce standards for the spectrum of activities

of health care delivery. The hospital has little or no control over 1) the patients who come to the hospital as referrals, 2) the physicians, who are the hospital's single most important resources for patient care and who make most of the decisions governing patient care, 3) the other health personnel acting in the hospital who are responsive to physician demands, 4) the equipment and technological advances required by physicians for patient care. Thus, with no common goals between the hospital and the providers and few rewards or penalties attached to appropriate resource utilization, institutional efficiency is very difficult to define, measure, or promote.*

Achieving efficiency in the use of health care resources is even more difficult at an inter-institutional level than within an institution. The same inhibiting factors apply, but on a broader scale. The lack of a common, measurable goal prevents definition of criteria which can be used to assess efficiency and hinders identification of the persons or institutions responsible for efficient utilization of resources.

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*The escalating costs of hospital care are not entirely based on organizational problems, but they cannot be divorced from them. Seventy percent of increased costs for hospital care can be attributed to personnel costs in wages and salaries.

Hospitals, however, raise wages while keeping the same number of personnel. To some extent, these raises reflect the growth of claims to professionalism and the increased unionization or unity of hospital employees. The rising costs are also due to the expanding number of personnel in the health field. Training programs for all types of health personnel have expanded steadily during the past 15 years. As new types of personnel are created, specialization increases and health care organizations hire greater numbers and more types of personnel. Such specialization may not always result in efficient utilization of personnel.

If hospitals individually and as a group were to determine the functions which needed to be performed, the amount of personnel and type of manpower needed to perform those functions could be trained and hired. This would improve efficiency in hospital utilization and in educational programs.

The role of the government exemplifies the multiplicity and duplication of goals. The promotion of public health and safety was delegated by the writers of the Constitution to State government. Many of the early health functions, such as sanitation and communicable disease control are delegated to county government. In highly populated areas where cities, rather than counties, are the focal political unit, city government has assumed responsibility for health services for its citizens. The federal government entered the health field through incentive grant funds and constitutional responsibility for interstate commerce. Broad national programs such as Hill-Burton, Medicare, and Medicaid added to the responsibilities of state and local jurisdictions, as well as increasing federal control. The broad and overlapping goals lead to confusion about who is to do what and where resources are to be allocated. Without clear responsibilities for inputs and outputs, "efficiency" criteria cannot be required upon any one institution or agency.

In addition, the cost control mechanisms in the health field are very weak. Health care is financed externally to health care organizations or providers, and costs have been allowed to escalate with no set limits. This does not promote need for joint decision-making to allocate scarce resources, nor a need to strive for efficiency.

In the past five years or so, government agencies have realized the impracticality of cutting costs through indirect means and have promulgated regulations such as those requiring a physician to request pre-admission authorization for Medicare patients and those limiting a patient's stay unless the physician requests an extension beyond a specific number of days. (Both regulations were contested, and the government retreated.)

Regulations on hospitals have also become more stringent. "Certification of need," for example, is required for construction of hospital beds and purchase of costly equipment. The basic dilemma remains, however, that the resources put into the provision of medical care are controlled by health professionals and institutions and do not necessarily represent the goals of health care at an inter-institutional or societal level, nor the total personnel or resource capabilities.

Fundamental to all the efforts to improve the effectiveness of the health care delivery and the responsiveness health care delivers to public demand is the need for a definition by providers and consumers of what the goals of health care delivery should be. Without a definition of what is wanted, it is impossible to know whether health care delivery mechanisms are effective or not, in meeting individual and public expectations, and if not, what components should be changed.

Hospitals and many other health care organizations have neither well-defined goals nor the control by which to enforce effectiveness criteria nor evaluate responsiveness to public demand. Each professional has his own goals for patient care, and these dominate the structure and processes regardless of the hospital's goals, let alone community or national goals. There is little opportunity for consumers to get together as a group to express their goals for health and medical care. As an individual, a physician may be a very efficient practitioner; he may practice high quality medicine; and his patients may be highly satisfied with the care they receive. Where providers and consumers can jointly define their expectations, such as in some community health centers, the health care organization has a basis on which to specify criteria for effectiveness and to make changes if its goals for effectiveness are not met.

Social, political, and economic conditions presently have great potential bearing on health care delivery. This is due in part to the fact that "health" is affected by social and economic conditions, ranging from diet to sanitation to education. The distinction between "health care" and "medical care" tends to be blurred. The organization of health and medical care delivery would be simpler if the distinction were made between the two types of care.

The attempts by the federal government to improve financial accessibility to medical care have gone to extremes without recognition of implications of such actions. Guaranteed payment for renal dialysis is one example. The federal government's agreement to pay for this resulted in innumerable hospitals purchasing the necessary equipment, renovating facility space, and setting up administrative structures to handle such patients. The overall cost to the system has been considerably more than initially projected because of all the indirect and direct costs involved in developing the personnel, structures, and facilities to provide the care. The total cost of the program has become so great that limitations on the financing of such treatment are inevitable. The results of the goal of accessibility clearly conflict with goals of cost containment and maximum effective utilization of scarce resources for optimal social benefit (i.e., the same dollar resources devoted to renal dialysis could have been devoted instead to mass immunization or screening programs).

Government efforts to improve the availability of services have included the production of more personnel and more facilities. Since professional personnel, especially physicians, decide for themselves where and what specialty they will practice, government efforts have not markedly changed the availability of medical care. Personnel

production which is not linked to system wide or organization goals cannot in itself be expected to meet those goals.

The nation as a whole has not yet attempted to deal with public dissatisfaction with the organization of health care except for a few categorical populations and illnesses (CEC, M & I, CH. & Y, Indians, Merchant Marines, C.). These approaches in themselves have tended to be fragmented and have not always been efficient, effective, nor responsive to the self-perceived needs of the populations addressed.

Despite the problems inherent in health care delivery organization, two models are exemplary of deliberate and successful attempts to combat the organizational deficiencies. Private group medical practice has been more widely developed in the United States than in any other country. Group practice is directed at coordinating the practice of independent practitioners. Physicians plan the goals of the practice together. A one-to-one physician-patient relationship is maintained, but the care of individual patients may be shared by several physicians either as consultants of particular specialties or through alternative coverage of all patients during off-hours. The physicians' independent responsibility for patients is thus broadened to include shared responsibility by all physicians for the collective group of patients. In addition, physicians have investment in the financial status of the organization. The equipment and support staff are decided upon jointly by the physicians. Patterns of utilization and resource allocation are thus the responsibility of the physicians, and there are direct incentives to maximize efficiency.

Prepaid group practice goes even further than group practice. Hospital utilization, as well as ambulatory care is usually included.

The patient pays a set fee, for which the group of physicians agrees to provide him with specific types of medical services, regardless of the total cost. The physician's financial incentive for efficient utilization thus extends to use of hospital resources as well as office-based resources. Furthermore, the physician and the patient have established mutual expectations about the services to be given to the individual patient and the costs of these services. The physicians, then, have specific incentives for effectiveness and efficiency, and there are definite criteria by which performance can be, and is, measured. Prepaid group medical practices have demonstrated reasonable assurance of accessibility, availability of quality service, cost restraint, and more efficient utilization of personnel and hospitalization.

Conclusions

The organizational analysis of the health care field would suggest that responses to the criticisms of inefficiency, ineffectiveness, and unresponsiveness must be dealt with by fundamental changes in organization of health care delivery, beginning with the definition of goals and with a unification within health care delivery organizations of providers and administrators in striving to attain shared goals. Specific organizational changes aimed at improving the efficiency, effectiveness, and responsiveness are the following:

1. A national policy must be developed specifying the role in health care delivery of providers, institutions, local government, third-party insurers and the federal government. The assumptions and the goals of federal participation in health care delivery should be specified. A critical distinction is that between the provision of "health" and "medical" care. The implications of health care as a socially insured "right" must be clarified. The extent to which the federal government will assure the availability and accessibility of services must be reconsidered and explicated to the public.
2. The functions of the medical care providers and the role of each type of personnel should be clarified. Educational institutions should join with health care delivery providers and institutions in determining manpower needs. Training programs, planning, licensing, and other manpower policies should be related to the explicit roles of the health care providers.
3. Within health care delivery organizations, medical staff and other health professionals must develop unified goals and structure for acting together rather than as a collection of individuals. The medical staff as a group must define priorities and mechanisms for communicating these priorities with the administration of the organization.

4. Clear lines of authority, accountability, and responsibility should be developed within individual institutions and among organizations. Practitioners and administrators must agree on the institution's functions. Those who have control of the utilization of resources and those who control the input and payment for resources must coordinate their efforts. Those who have the authority for resource utilization should share in the responsibility for fiscal management.
5. The internal organization of health care providing institutions, particularly hospitals, should be the first point of health care delivery reorganization. The functions and roles of each health care institution and the relationship of one institution to another should be established. The regionalization of health care services, including personnel, institutions, and training should be planned and implemented by provider institutions in order to avoid duplication and inefficient utilization of scarce resources.
6. The role of local, state, and federal government should be re-examined. Authority and responsibility should be clearly established. Duplication and conflict between agencies should be eliminated.
7. Performance standards, directly related to goals, should be established by providers and institution. Criteria for efficiency, effectiveness, and responsiveness should be developed by providers and institutions and incorporated in institutional and inter-institutional goals.
8. Government guidelines and/or pressure upon administration of medical care institutions, especially hospitals, without internal organization for setting goals and priorities and a mechanism for carrying out decisions will only escalate conflict and inflation.

9. Consumers, as well as providers, should be given an opportunity to affect health care delivery organization. Direct financial contribution for institutional and provider services is a mechanism suggested to achieve this.

FINANCING

Glenn Wilson

FINANCING

"Economics is the study of how mankind copes with the problem of provisioning itself."[1]

There appears to be a consensus that "health care is the right of every American" and now the Congress is engaged in a debate on how the nation will "provision" itself. The debate is focused on the scope of benefits, shall they be financed with tax dollars, tax and private expenditures, and whether the government or private organizations shall be in administrative control.

These are assuredly important questions, but there are some important prior questions that need to be answered.

It is altogether clear that an infusion of federal funds will stimulate economic activity. Half of the new dollars spent on health care since the enactment of Medicare and Medicaid have been inflation.[2] The further opening of the federal purse with an unclear objective, without responsible and reasonable constraints, and without a plan to assure access, availability and quality is unlikely to alleviate public dissatisfaction or to dampen the inflationary fires.

At a time of growing national awareness of the finite nature of the world's resources, it seems necessary to ask for a clearer definition of the national objective with regard to health care.

As the complications and variations increase, the national passion for quantification, model building and systems analysis proceeds at an ever more rapid pace.

All too often implicit and explicit assumptions are not examined and ill-defined terms and phrases have been repeated so often they take on the character of truisms.

In an attempt at clarity we propose, for purposes of this presentation, to critically examine some of these "truisms" and set out some of the assumptions which, in our judgement, are essential to any national health insurance financing proposal.

Health has been defined by the World Health Organization as "physical, emotional and social well-being."[3]

We begin with a fundamental assumption: the differences between health care and medical care are more than a matter of words. The lack of precision in using the terms and the use of the terms interchangeably further obfuscates an already difficult area. We do not challenge the fact that the social discontinuities in our society place a heavy burden upon the medical care system.

However, one needs to state with as much precision as possible what is to be financed.

At least for the purposes of defining the national objective and for estimating costs, it may be useful to more closely examine the question from three perspectives.

I. Positive promotion of health education, control of communicable diseases, vaccination and innoculation.

II. Treatment of acute illness and amelioration of chronic illness, pain and disability.

III. Counseling and other supportive services for that small percent of the population who currently use much of physician office care for psycho-social problems.

We are persuaded that it is of the utmost importance to separate, within the limits of human capability, health care from medical care, at least for the sake of defining objectives, setting national priorities, developing training programs and for the financing of whatever alternative is ultimately adopted.

II. Basic Premises of Medical Care Insurance

Insurance can be defined as a formal social device for reducing individual financial risk by combining exposures or a device for the transfer of risks of individual entities to an insurer who agrees for a consideration to assume, to a specified extent, losses suffered by the insured.

The aggregate number of hospital days, physician office visits, surgical procedures, and even lab and x-ray examinations can be accurately predicted for a defined group in the population or for the population as a whole. Therefore, illness care risks can be pooled. However, distinct from other forms of pooled risks, illness care loss is difficult to specify.

In other forms of pooled risks, e.g., life, accident, fire, household, automobile and even retirement insurance, there are reasonably objective measurements of the loss incurred. Although the price to replace an automobile fender may vary, it can be determined with reasonable accuracy that only the fender must be replaced. The same is true with a fire destroying all or part of a home. It should be acknowledged that pain and suffering in personal liability claims and disability insurance produce difficult non-objective questions for the insurance adjustor.

Illness cost insurance is replete with non-objective questions. All illness care, with the exception of house calls, can be provided in the hospital. There is no uniform measurement of what constitutes a physician

office visit. There is no agreed-upon array of required laboratory and x-ray examinations even when specific diagnosis is established. The necessity for hospital care and surgery is a matter of clinical judgement in addition to objective measurement. The need for care is unknown and the demand for care is overlaid with emotional and cultural content. And, finally, an arm, leg, heart, kidney, or gallbladder is not a discrete insurable entity but is irrevocably a part of a whole person. Health care risks can be pooled, but objective measurement of the loss is at best an imprecise approximation.

III. History of Health Insurance

It is still customary to refer to "voluntary health insurance" in the United States. Prior to 1946, the individual either paid for services when received or agreed to have the cost of insurance deducted from his pay. Implicit, if not explicit, value judgements were required of the individual for himself and his family as to the relative merits of physicians' services and hospital care compared to other goods and services available in the community.

A singular event in 1946 dramatically altered the course of medical care financing in the United States and was the first step away from the free market which had prevailed up to that time. The country was operating under strict wage and price controls. The coal miners, led by John L. Lewis, went on strike. After an extended work stoppage, Secretary of the Interior, J.A. Krug, and John L. Lewis entered into an agreement to settle the miners' dispute.[4]

Consistent with the public policy of wage control, the agreement provided for a portion of the mineworkers' productive capacity to be paid into a health and welfare fund for a retirement program and a medical care program. This agreement was clearly in lieu of a wage increase. The funds were paid into an independent trust fund on behalf of the coal miners. The funds were construed by government not to be a wage increase since they were not paid directly to the individual. To the extent that individual coal miners had been paying for medical and hospital care, the funds had the same impact as a wage increase since this agreement relieved the coal miner from paying for medical care when services were received.

The Internal Revenue Service declared in a subsequent case that these monies paid on behalf of employees were not taxable as personal income. Indeed, although it was cost to the employer, deductible by the employer as labor cost, and in lieu of wages for the employee, it was declared non-taxable for both parties. This then was the inception of the managed market for medical care financing in the United States.

Shortly after the Krug-Lewis agreement, a number of other labor unions bargained for similar benefits. Most of the early contracts specified a dollar amount to be contributed by the employer on behalf of individual employees. By the mid 1950's as health care costs continued to increase, the employer/employee contract specified a percent of the cost of a stated benefit package. In recent years the total costs of benefit packages have become the burden of employers. Ford and General Motors, it is estimated, spend $175 per new car for employee health benefits.[5]

Trade union bargaining set the pattern which, by the late 1960's, was being followed by most of the larger employers in the United States even in the absence of a trade union; employer/employee contributions to medical care rose from $856 million in 1950 to nearly $20 billion by 1973.

This evolving system left retired persons, the unemployed, and those employed in smaller firms largely uncovered. The enactment of Medicare and Medicaid in the mid '60's was a public response to provide financing for some of those left out of the system. Social Security or Medicaid beneficiaries are essentially in the same financial position as members of employee groups. Taxes are collected and can be used only for Medicare benefits. There is no obligation to accept the benefits. A group of managers make the decision on the cost and scope of benefits consistent with the law in the case of Medicare and Medicaid beneficiaries and consistent with the collective bargaining agreement and/or with the employer/employee agreement in the case of employed persons.

Managers of these health insurance funds, whether in the private or government sector, are conduits for the flow of the funds. There may be some theoretical difference between private compulsion and public compulsion, but there is little difference in practice.

Although it was never clearly stated, it appears to have been assumed these managed funds paying the cost of medical care would extend the employees' purchasing power by freeing up funds normally used for medical payments. Despite the rapid escalation of funds available, the amount of medical care bills covered by insurance remained at a fairly consistent 30% of all costs.

IV. Insurance vs. Service

Although health insurance promises services, it does not assure services. An individual with health insurance does not call Blue Cross/ Blue Shield or the commercial insurance companies to locate a doctor or to get a hospital bed. The individual is only assured that if he gets sick and if he finds a doctor, a set amount of money will be paid to him or paid on his behalf.

The public assumes all too frequently that financial coverage assures service. Benefits, equated with services, are announced if not promised by the employer, the union, or government. The funds to pay for costs are then passed to a third-party--Blue Cross/Blue Shield or a commercial insurance company. The scope of benefits and costs is largely determined by these two groups.

Although there are examples in the private sector, perhaps the most glaring example of questionable impact across the system of a single financing action is the inclusion of payment for extended care in the Medicare program. The impetus to include extended care was the danger of excessive hospital care.

It was clear that when Congress passed the extended care legislation there was an inadequate supply of personnel and facilities to provide the service. There was an almost immediate recognition of the absence of quality extended care resources. Quality standards were written requiring minimum nursing service. Extended care facilities began to compete and further escalate nursing compensation.

Some consciously agreed to the inclusion of extended care financing in Medicare in order to stimulate the development of quality extended care; and billions in expenditures have, at best, brought about an uneven development and a number of public scandals.

The providers are rarely, if ever, consulted but are simply expected to provide what has been promised. There is little evidence to support an argument that those who determine benefits and costs attempt to calculate the resource capacity to deliver the service. The capacity is assumed.

Committed to a benefit schedule and a dollar cost for at least the period of the contract, the third party, unwilling or unable to significantly influence the provider, becomes a manager of money not of benefits or service.

At best, an unequal discussion can be held on utilization and cost. Although Blue Cross/Blue Shield is dominated at least superficially by hospital people, the utilization and costs of hospitals are not under the control of the hospital director or of even the board of directors.

The dollars set aside for hospital care only have tripled in 20 years. Millions of Americans have been promised a hospital bed. The promise was made by a series of groups, the dollars flowed to yet another group, and a third group decided when and how much hospital care would be used.

V. The Doctor and the Patient

The relationship between the doctor and the patient in the ideal is, or should be, highly personal. Arguments are advanced that fee-for-service payments are essential for the relationship. Changes in the past 30 years appear to require some re-examination of this argument.

For much of medical care service, the patient no longer is required to make a conscious decision on "what is it worth". For employed Americans and those covered by Medicare and Medicaid, medical care services have taken on most of the characteristics of a free good. There are the obvious gaps in coverage and for the working poor, the unemployed and other identifiable groups there may be no financial coverage. Benefits are determined by others who may have overlooked his most important need; money is withheld from his pay without his consent for a service he is unable to evaluate except in terms of human satisfaction.

Fee-for-service stimulates work but also produces exquisite measurement and management problems and seems most applicable when there is a uniform quantifiable unit of measurement.

One can quantify an appendectomy, a T and A, or a cholecystectomy, but the incentive to perform the procedure and collect the fee may stimulate action even when a more conservative approach is more appropriate. There is no quantifiable agreed-upon measurement of an office visit, a hospital visit, or of most of the other services provided by a physician. There is no objective measurement of need even when a specific diagnosis has been established. There are no objective measurements of the number of visits or hours necessary to care for the patient.

Efforts to prevent abuse of insurance usually involve either a deductible; i.e., payment before the insurance coverage begins, or co-insurance, which places a share of the cost on the patient when services are received. It should be kept in mind that the patient, on whom the financial burden is placed, has little voice in the decision.

Once the patient initiates the first contact with the physician, the patient's discretion is largely circumscribed. Unless one contemplates a patient debating the necessity of a consultation, lab and x-ray work, hospitalization or surgery because of a deductible or co-insurance, such procedures would appear to be ineffective.

Much of the literature proclaiming that deductibles or co-insurance reduce utilization and cost is less than complete. They almost certainly reduce the costs to the insurance carrier and may also restrain premium increases, but they pass costs back to the consumer; and consequently, utilization and cost, albeit unreported, may in fact increase.

There is a vast amount of literature on the impact of deductibles.[6] One can conclude from these data:

I. A deductible can be a significant barrier to service if it is sufficiently high to become an economic burden.

II. Deductibles may prevent the poor from seeking even basic services.

III. Deductibles tend to discourage medical care demand for convenience if the amount is high enough.

VI. Catastrophic Coverage

The economic peril of catastrophic illness to a family is regularly recounted by the public media and cannot be discounted lightly. There are many moral values and resource allocation questions which are posed, however. There appears to be no inherent way to introduce the notion of marginal utility or marginal value. In nearly all economic enterprises,

except medicine, the question is asked what is the potential additional gain or value for the additional expenditures. The sacred nature of life in the Judo-Christian culture makes the question inappropriate. Therefore, "everything" must be done. This has been nicely summed up by,

> The present system which cunningly conceals its decisions to sacrifice lives in order to conserve resources may be just what we want. Quality medical practice serves as a protective shield for our highly valued myth. Provide universal catastrophic coverage and the costs of preservation may skyrocket, although the number of additional lives saved may be minimal. When weighed against the lives saved for the same resources devoted elsewhere, the net loss in life could be significant.
>
> Perhaps of greater consequence, any equity or morality considerations relating to our present noncoverage of catastrophic illness might be compounded, not simplified. With the frontiers of knowledge pushed back, and quality medical practice requiring more extensive resource expenditures, we might take more actions that would weaken our own moral stance.
>
> As medical science advances and the dictates of quality medical practice evolve, key policy questions will surely be, "Can the myth be preserved? How much will it cost? Is it worth it?" In making policy assessments on the provision of catastrophic coverage, it will be important to determine how this would affect these answers.[7]

There is also the potential that unbridled catastrophic coverage will tend to skew training programs and professional performance toward the uncommon and materially drain away financial and human resources to provide adequate care for the majority of the nation's medical care problems.

VII. The High-User and the Non-User

There is yet another observable, but to a great extent unexplored, phenomenon in the financing of medical services. A number of studies demonstrate that a relatively small percent of any given population uses a significant percent of all medical services. There is data[8] to suggest

that 4% of the population uses something over 25% of all physician services and that 12% account for 50%.

There is another large group in the population which uses little or no medical care. This is especially true for females age nine or ten until the child-bearing years and for males from the same age until the late thirties and early forties. If one excludes the child-bearing segment of the population, males over the entire life span use more medical care than females.

Some people examine these data and come to the conclusion a number of individuals are not receiving an adequate amount of medical care. There is an inference which can be drawn, if not a conclusion, that a number of people do not need the services physicians and other medical care providers have to offer.

Over time, the high-user group tends to use less service when the service is accessible and there are no longer financial barriers, but the use still continues quite high. Counseling and support services may be uniquely important for this group. Most often, rules affecting the total population are promulgated by insurance carriers and government rather than identifying the high-user group and providing more appropriate service for this identified group. The demand for medical care varies so widely between distinguishable groups as to make a single rule punitive for one and less than adequate for another.

VIII. The Cost Basis of Physician and Hospital Services

The delivery of personal medical services is, in economic terms, a fixed cost enterprise.

The cost of a physician or other practitioner's office is largely fixed with few variables. Rent, utilities, and personnel constitute the

bulk of the cost. The only significant variable is the amount of income expected by the practitioner. In 1973 there was a fixed cost of approximately $7 billion in physicians' practice overhead, or an average of approximately $25,000 per physician per year. In classical economic terms if costs are to be reduced, the entrepreneur in a fixed cost industry must either increase the rate at which individual units are processed through the enterprise or extend the hours of utilization. The latter course of action is not readily available to the solo physician since much of the cost is in personnel and there are limits to the number of hours the physician can work. Increasing the speed of service is possible only within the constraints of quality in such a highly personalized service. These two alternatives do not appear to offer much alternative for the reduction in the costs of services.

Sharing of offices and personnel appears to offer the potential for reducing this fixed cost and for greater utilization of the personnel and the physical facilities, but this can only occur if physicians change their work patterns and do not all converge on the hospital in the early morning hours leaving their offices unused or under-used.

Hospitals are also fixed cost enterprises.

More than 70% of hospital costs are in personnel. Hospital staffing is usually arranged on the basis of high occupancy, but rarely attains optimum level for a variety of valid reasons. It is not easily arranged to reduce the personnel component based upon occupancy even when occupancy falls well below the 80% level. Under-utilization of the hospital's resources has come to be the expected course of action.

The scope of services offered in the hospitals, the staffing patterns, and costs, although technically the responsibilities of the hospital director and the board of trustees, are inevitably determined by capabilities and desires of the medical staff.

In most of the United States, the medical staff has no fiscal responsibility or accountability for the cost of hospital care but does have extensive control over the scope of services and utilization. Since hospital care is financed by insurance as a separate category of services, it is extraordinarily difficult to clearly fix responsibility for the cost and ineffective use of hospital beds.

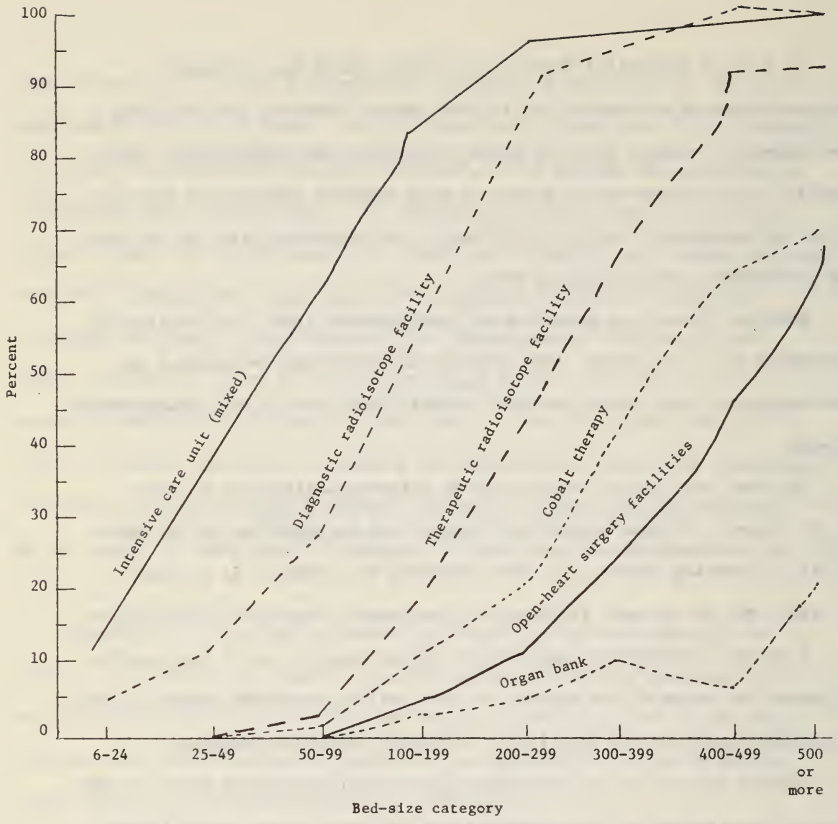
Hospital revenue is generated by reimbursement from third parties or government on a cost basis. The hospital is relatively independent in developing new heavy fixed cost and including the cost in the reimbursement formula.

The cost per unit of service may be extraordinarily high because of low volume. In some instances this cost may be justified on the basis of its life-saving nature. In many instances the evidence is not quite so clear, and in too many instances it represents extravagant duplication.

A variety of community and medical forces seem to compel the hospital to expand the scope of its service to meet real or perceived community need. The reimbursement system does little to retard these developments.

Federal efforts to regulate these territorial expansions have not yet produced results and the new organizations now being formed under federal prodding will not necessarily be able to deal effectively with the problems.

The magnitude of the problem is demonstrated on the following chart.



Percent of Community Hospitals Reporting Seclected Facilities and Services, by Bed-Size Category, 1974

The placement of complex diagnostic equipment appears to be an ever-accelerating problem in the hospital area. The micro problem of under-utilization becomes even more of a problem at the macro level because of cost reimbursement.

Further, for some services such as coronary surgery,[8] not only is it expensive; but under-utilization appears to have serious quality implications.

Unplanned or uncoordinated continued growth of the scope of services in these hospitals is clearly one of the most important considerations in any national financing legislation.

The forming of Health Service Agencies was developed to deal with this as well as other questions.

Of the more than 3,000 counties in the United States, only 556 are without an acute general short-term hospital.[9] Before a conclusion is reached that this constitutes maldistribution, further examinations of the data are required. The mid-point of only 17 counties are more than thirty miles from a town with an acute general hospital. These hospitals are likely to continue to expand their scope of services.

IX. The Medical Care Market

The market is a frequent reference in medical care literature. There is rarely a definition of market and the unusual character of the medical care industry is rarely explored.

One can conjure up visions of Adam Smith's "unseen hand" bringing about supply and demand equalibrium in medical care, but indeed the current financing seems to preclude this possibility.

In the course of the past 30 years, the funds flowing into the medical care market have developed many of the characteristics of a managed market.

Most of the funds paying for health services are provided either by the employer/employee relationship or through action in various levels of government. Funds to pay for the benefits are withheld from the direct income of the individual.

Payment of these funds to medical care providers has retained most of the characteristics of a free market.

Physicians have been continuously reassured by private health insurance and government that they are private entrepreneurs. They have behaved, as should have been anticipated, in a classical free enterprise fashion. They have exerted an effort to maximize their incomes; and recently, it appears after having maximized their incomes they are now seeking more leisure.

Hospitals, also as private entrepreneurial institutions, have tended to increase the scope of their services even to the point of duplicating expensive services.

One of the fundamental difficulties in the current financing arrangement is the managed nature of the money flow into the medical care market and the free enterprise disbursement of these funds.

Failure to recognize this inherent incompatibility of the parts of the financing system brings about inappropriate and ineffective public policy. Effective clear policy to correct or alter the "free enterprise" side of the equation may be entirely inappropriate when it impacts on the managed market.

Medical care insurance, implicitly if not explicitly, promises services. The flow of funds into a pool earmarked for physicians' services and hospital care is determined by a small group of individuals with little or no capacity to influence the supply, location, availability, or quality of the highly personalized services to be provided. Those responsible and accountable for the dollars are given no authority over the number, types, and location of personnel necessary to provide the service. They have little or no authority over the fees to be charged or the costs per hospital day; in large measure, they are merely conduits for billions of dollars.

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X. The Categorical Approach to Financing

Medical care has been financed in a highly compartmentalized fashion-hospital care, surgical, regular medical and major medical.

The financial growth in these areas are shown in the following tables.

PERCENTAGE OF WORKERS IN PUBLIC AND PRIVATE EMPLOYMENT WITH HEALTH INSURANCE BENEFITS, 1950-1970

	Hospital Care	Surgical	Regular Medical	Major Medical
1950	48.7	35.5	16.4	--
1955	60.0	54.7	37.0	4.0
1960	68.9	65.5	50.2	16.5
1965	74.3	72.0	60.3	26.8
1970	80.2	79.2	71.1	35.8

Source: U. S. Department of Labor. Handbook of Labor Statistics 1975-Reference Edition. Bulletin 1865, 1975, p. 310.

COVERAGE AND CONTRIBUTIONS UNDER EMPLOYEE-BENEFIT PLANS IN RELATION TO EMPLOYED WAGE AND SALARY LABOR FORCE AND PAYROLL, 1950-1970

	Hospitalization	Surgical	Regular Medical	Major Medical
Covered Employees as Percent of All Wage and Salary Workers				
1950	48.7%	35.5%	16.4%	--
1955	60.0	54.7	37.0	4.0%
1960	68.9	65.5	50.2	16.5
1965	74.3	72.0	60.3	26.8
1970	80.2	79.2	71.1	35.8
Employer-Employee Contributions as Percent of All Wages and Salaries				
1950	0.40%	0.21%	--	
1955	0.69	0.38	0.02%	
1960	0.96	0.49	0.18	
1965	1.25	0.61	0.31	
1970	1.45	0.77	0.44	

Source: Walter W. Kolodrubetz, "Two Decades of Employee-Benefit Plans, 1950-1970: A Review." Social Security Bulletin, April, 1972, p. 17.

The promise of a benefit and the creation of large sums of money to be used only for a specific service has demonstrably stimulated manpower training programs, physical resources, and services with little or no regard for the appropriateness or the priority of service.

The fourfold increase in the dollar amount only available for surgery from 1950 to 1970 has not been a neutral factor in surgical training programs, the number of operating rooms in the hospital, the rate of surgery, or in a host of other factors.

XI. One Economic Approach

One promising development in health care financing has been an organizational one. The federal government has recently stimulated the development of Health Maintenance Organizations. This developed from the experience with prepaid group medical practice plans from the previous twenty-five years. There are several significant differences between the organization as set forth in the HMO regulations and the organization of prepaid group practice.

Although the experience of prepaid group practice may not be universally applicable, there are several important lessons to be observed from existing plans.

A. Prepaid group medical practice is an alternative to existing health insurance, therefore the individual has a choice to join such a plan or to use existing insurance.

B. Prepaid group medical practice <u>is not</u> health insurance as the term is customarily used. None of the other existing financing mechanisms assume any responsibility for and have no authority to assure access to care.

C. Prepaid group medical practice plans enter into a moral, if not a legal, contract with those who voluntarily enroll for a sum of money usually set annually to arrange for and assure access to a defined range of health services 365 days per year 24 hours per day.

D. To complete this contract, the health plan and the medical group associated with the plan must:

1. project the population to be served on an age-sex basis with some accuracy, and

2. develop the physical facilities and retain and recruit the personnel to deliver the expected services.

E. Prepaid group medical practice plans have a single source of income -- members' payments -- which is paid as a single lump sum. Thus, the health plan policy makers have a single source, rather than categorical payments, to build and maintain hospitals or pay the medical group.

F. Prepaid group medical practice plans must, therefore, carefully allocate their financial resources between inpatient and outpatient physical facilities, physicians, and other personnel in order to meet their obligation to the members.

The President's Commission on Health Manpower, 1967, in Appendix IV concluded:

> The Kaiser Foundation Medical Care Program provides comprehensive services to more than a million and a half members drawn primarily from the working population. These services are provided at significant savings by comparison with the cost for equivalent services purchased in the surrounding communities and the country at large.
>
> The quality of care provided by Kaiser is equivalent, if not superior, to that available in most communities. Permanente physicians use standard medical practices and procedures. Patient satisfaction is indicated by the overall flow of patients into Kaiser from competing health plans under the dual choice available to all Kaiser subscribers.

Kaiser Hospitals are also operated in a standard fashion. The per diem costs of Kaiser Hospitals are only slightly lower than non-Kaiser hospitals.

The cost savings of Kaiser relative to the usual delivery system are manifested both in lower absolute expenses per person for care and in lower trend rates of increase in expense. These economies appear due almost entirely to the elimination of unnecessary health care, particularly hospitalization. This has been brought about principally by decreasing admission rates for specific diagnoses.

The Kaiser Foundation Medical Care Program has achieved real economies, while maintaining high quality of care, through a delicate interplay of managerial and professional interests. This has resulted from structuring economic arrangements so that both professional and managerial partners have a direct economic stake in the successful and efficient operation of the overall program. As a result, there has been created a cost consciousness among the health professionals and a health care consciousness among the administrators which enables them to work toward a common goal without either sacrificing or overemphasizing their own points of view.[10]

SUMMARY

The growing awareness of the world's finite resource capacity and the consensus that some form of national health financing will be enacted in the immediate future poses some unusually difficult public policy questions.

If health care or medical care is to be the right of every American at a socially acceptable cost, the national objective requires a statement of great precision. Health care and medical care are not synonymous; the personnel required, the organization of the system and the financing require entirely different approaches. To assume, if the government provides national financing and brings about a more equitable distribution of currently trained personnel, that health care will be the right of every American citizen does not appear valid.

The infusion of additional funds, either public or private, without a clear objective and carefully conceived plan will almost certainly continue the inflationary spiral of the past.

The unusual characteristics of the medical care market require careful scrutiny before decisions as to the scope of services, the organization and the financing of the services are made.

I. Supply, of either personnel or physical resources, in the medical care area tends to create its own demand.

II. Physicians and other personnel either directly control or substantially influence the range of services once the patient seeks the initial visit.

III. Physician cost is largely fixed; the only significant variable is physician net income. In a highly personal service such as medical care, there are clear limits, consistent with quality, to the most efficient use of this high fixed cost. Well-organized group practice appears to offer the most potential.

IV. Hospital care is also a fixed cost enterprise, with most of the cost in personnel. To reimburse a fixed cost economic unit with "cost reimbursement" provides little or no incentive for cost containment or for restraint of the addition of excessively expensive and usually underutilized new services.

V. The financing of services on a categorical basis, i.e., by hospital care, extended care, physician office care, physician hospital care and by disease tends to distort not only training programs preparing personnel but also the utilization of services without adequate regard to the appropriateness or necessity.

VI. There is no single individual or group of individuals accountable for the responsibility and the authority for the effective and economical use of institutional medical care. The board of trustees and the hospital director, at least on the organizational chart, are theoretically in charge. However, the skills, working patterns and desires of the hospital medical staff in the long run determine the scope of services to be offered and the staffing patterns which largely establish the hospital cost.

VII. The course of medical treatment is a matter of clinical judgement in addition to objective fact.

VIII. The physician's self image as "healer" and the public expectation of the physician as "healer" presents to the physician a vast array of

problems for which the physician is ill equipped and for which there is no adequate remedy in a society filled with social discontinuities.

IX. Finally, the human capacity to absorb medical care appears to be splendidly elastic. This is especially true when the responsibility for the payment and the cost are sufficiently removed from the individual.

The following points should be addressed in consideration of national financing system:

I. The objective of national financing should be clearly spelled out, whether it is to be health care or medical care. Counseling, support, and assisting people to cope with the stresses of life appears incompatible with fee-for-service financing as currently arranged.

II. A national health policy group, probably best organized and serving the Congress, appears essential. If, as is reasonably apparent, the supply of physicians and hospital beds create their own demand, those responsible for financing cannot constrain cost unless and until they can influence the supply and distribution of personnel.

III. History, in the United States and elsewhere, would clearly indicate that irrespective of the public or private financing of medical care, the consumer becomes increasingly uninvolved in cost as the burden is placed on either the employer-employee relationship or government. In an effort to insure broader public participation in any future system, financial participation would appear to be a prerequisite. Financial participation by the consumer should be carefully structured in order to insure that the poor are not denied needed services and that preventive services are available without monetary barriers.

IV. Capitation payments including all physicians' services, hospital and extended care service, and facilities construction should be widely available on a regional basis and should be encouraged.

V. The current payment system should be carefully and critically re-evaluated to insure the payment system does not stimulate inequitable payments for services either by specialty or geography.

VI. Institutional payments to hospitals or extended care facilities on a cost reimbursement basis in an anachronism unless the scope of services is constrained by some public body.

VII. Those with most of the authority, the doctors, are and should be be fiscally accountable for their actions.

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